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of the
American Veterinary Medical Association

FORMERLY
AMERICAN VETERINARY REVIEW
(Original Official Organ U. S. Vet. Med. Ass'n.)
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The American Veterinary Medical Association

CONTENTS

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H. Preston Hoskins, Secretary-Editor, 537 Book Building, Detroit, Mich.

Vol. LXXX, N. S. Vol. 33 **January, 1932** **No. 1**

IOWA OBJECTORS SEE THE LIGHT

Commentators on the outcome of the recent unpleasantness in Iowa have expressed various opinions in connection with the interpretation of results of postmortem examination of reactors disclosed by the tuberculin test.

In some cases, where the percentage of reactors was comparatively low, observers have taken occasion to point out that the owners of these herds really had little to fear after all. It appeared that some of these misguided farmers had been afraid that the test would result in their entire herds being condemned. After the test was over, and only a few animals reacted, they breathed sighs of relief.

In other herds, where reactors were more numerous, observers have seized the opportunity to point out the need for the test. This was particularly appropriate in several instances, where registered cows, apparently in perfect health, reacted to the test, were condemned, slaughtered and revealed extensive tuberculous lesions at autopsy.

In both cases the outcome has been favorable to the cause of tuberculosis eradication. Those who were fearful of the results, in some cases, have been shown that their fears were largely groundless or very much exaggerated. Others, more skeptical than fearful, have been shown that the test is reliable and will do what veterinarians have claimed for it.

WHAT OF THE PROFESSION?

In attending meetings of veterinarians one hears much—some condemnations and some commendations—about influences affecting the profession as a whole. All those vitally interested condemn practices that tend to break down, and commend those that are upbuilding and uplifting.

In the strife of a highly specialized and complicated civilization there is the constant temptation to depart from the ethical principles that years of past experience have demonstrated to be reasonably sound. That the guiding principles are not what they should always be is admitted, but until better standards are evolved, we should abide by those we have. The moment that any considerable number of those in the profession (and sincerely desirous of remaining in it) depart—usually for financial reasons—from the approved standards of the profession, that day is one of retrogression. The profession as a whole is judged in localized communities by the behavior of its representative in that community. Therefore, live up to the highest standards of your profession—if you are in doubt, give the profession the benefit of that doubt—and let it not be said that by your actions you have lowered the dignity of or weakened the calling that has given you professional birth. In all individual activities the profession is on trial. The profession has made you; do you, therefore, make the profession.

We must also guard against those professionally moral delinquents who, trained in the profession, and sheltered and encouraged by it during their professionally embryonic days, though immediately they are able to stand without aid, renounce all their professional obligations. They are the lone wolves. They use the gifts of the profession wholly selfishly for personal gain and with entire disregard for all ethical precepts. We refer particularly to those whose professional standards are so blunted that they are willing to sacrifice the profession—and incidentally those they pretend to serve—in order to line their own pockets with gold. They pose under the guise of friends to live stock owners—they are frequently applauded by unthinking persons—though they are in fact one of the greatest menaces to those the ethical veterinarian attempts to serve. Every man is entitled to a fair hearing, and circumstances alter cases, but those found to be wilfully and persistently guilty of these practices should be cast out as something loathsome. "Their's is the greater sin."

There is a brighter side to the picture. Those in the profession are not unmindful of the record of sound growth and substantial achievement of the profession of veterinary medicine. This is evidenced by the stamping out of contagious pleuro-pneumonia and keeping it out, several times overcoming foot-and-mouth disease, the discovery of an effective method of immunizing

WILL YOU BUILD?

swine against cholera, a profession well on its way in eradicating tuberculosis of domesticated animals, the fact that the Texas fever tick has been driven almost into the Gulf of Mexico—and don't forget the pioneer work in regard to this disease, the meat inspection service; and were it not for the great difficulty in

obtaining reports of the work of individual veterinarians, there would be even more brilliant accomplishments to point to than those of collective effort.

All of this has been accomplished, in spite of humble birth, and many times despite the terrific opposition of those who should have encouraged our efforts. Hampered by all human frailties, passions and iniquities—both within and without—we stand on a record equaled by few and excelled by none.

How best—for the good of those we would serve professionally—may we strengthen ourselves? It is admitted that we must not dissipate our efforts, but rather live up to the truism, "In union there is strength." Doctor Schmoker's accompanying cartoon illustrates this better than the written word. A united front, with as nearly as possible 100 per cent membership in our professional societies—and without in any sense discrediting other highly laudable phases of excellence of service—in the writer's opinion w ll do as much and possibly more than any other single thing to bring about a condition we so much desire.

If every veterinarian sincerely interested in the welfare of his profession will forget his pet grouch—much more good can be done "kicking" from the inside of an organization rather than from the outside—and obtain an additional member for the American Veterinary Medical Association, the results will manifest themselves surprisingly. This is a message to you.

R. R. D.

COLORADO JOINS THE LIST

Dean Glover has announced that, by action of the faculty council of the Colorado Agricultural College, and with the sanction of the State Board of Agriculture, one year of college training will be required for matriculation in the Division of Veterinary Medicine, beginning with the 1932 fall semester. The announcement states that the pre-veterinary year is a "decided innovation," and for that reason has been made flexible intentionally, with a view to modifying it as experience suggests. Chemistry, English and biological science must be included in the pre-veterinary year.

Three of our veterinary colleges have now announced their intentions of going on a five-year basis this fall: Cornell University, Kansas State College and now Colorado Agricultural College. Iowa State College is already operating on the five-year basis.

HOG CHOLERA HELD IN CHECK

After a five-year period of comparative freedom from hog cholera, the disease began to show some of its old-time form during the latter part of the summer and did not show indications of abating until the autumn months were almost past. Under date of December 10, the Division of Hog Cholera Control of the U. S. Bureau of Animal Industry announced that the disease was on the wane, following the use of anti-hog cholera serum for protecting exposed herds and treating others already infected. In some sections the use of serum was so general that stocks of the product maintained by serum companies were seriously depleted and in some cases completely exhausted.

The financial condition in which many farmers found themselves the past year added to the difficulties of the situation. The inability of some owners to pay for serum imposed new responsibilities on many veterinarians. The prompt assistance of banks in lending money for the purchase of serum, frequently on the advice of local veterinarians, was the only thing that saved the situation in some sections. In this connection we are reminded of the old line, "Ill blows the wind that profits nobody." The 1931 outbreak of hog cholera came at a time when veterinary practice was at a rather low ebb throughout the Corn Belt. As a result, veterinarians were able to give a large part of their time to vaccinating against the disease, and to do this promptly. Results were better, as far as the owners of the hogs were concerned, and what might have turned out to be a very dull fall season for the veterinarians, proved to be an unusually busy one for many members of the profession.

PRESIDENT DYKSTRA ON NUMEROUS PROGRAMS

President Dykstra is finding out what it means to be president of the American Veterinary Medical Association, if we may judge by the number of meetings which are on his schedule, this winter. He started out by attending the annual meeting of the Eastern Iowa Veterinary Medical Association, at Cedar Rapids, on October 13-14. The next meeting was that of the Nebraska State Veterinary Medical Association, at Omaha, December 8-9. Dr. Dykstra discussed "Equine Practice" at the latter meeting.

During the first week in December, Dr. Dykstra was in Chicago attending several meetings held there, including the meeting of the Executive Board of the American Veterinary Medical

Association and the annual meeting of the United States Live Stock Sanitary Association.

During the first week in January, Dr. Dykstra will go east to attend the conference of veterinarians at the University of Pennsylvania, where he is on the program to discuss "Surgical Handling of Infections of the Sinuses in Equines and Bovines." The following week will find him at Blacksburg, Va., assisting with the third annual conference for graduate veterinarians, at the Virginia Polytechnic Institute. Dr. Dykstra will leave Virginia in time to attend the annual meeting of the New Jersey Veterinary Medical Association, in Jersey City, the latter part of the same week.

The third week in January, Dr. Dykstra will be in Indianapolis, participating in the program of the annual meeting of the Indiana Veterinary Medical Association. On this occasion he will handle the cattle end of the program.

ADDRESSES WANTED

First-class mail, addressed to the following members of the A. V. M. A. at the addresses given, has been returned by the Post Office undelivered. As we are anxious to get in touch with these members as soon as possible, the list is being published in the JOURNAL with the request that, if any of our members can supply information concerning the present whereabouts of any of these missing members, they oblige us in that respect.

Denney, Paul O., 42 W. 43rd St., New York, N. Y.
Harrison, W. E., 155 S. Ventura Ave., Ventura, Calif.
LaFayette, W. W., 2543 S. Cypress St., Sioux City, Iowa
Miller, W. C., 459 W. 43rd St., New York, N. Y.
Murphy, G. H., 1308 W. 68th St., Chicago, Ill.
Schmidt, A. I., 1206 City Park, Houston, Texas
Schrumpf, Henry R., 333 N. Noble St., Indianapolis, Ind.
Whitmore, Wm. W., Box 244, Creston, Iowa
Woods, John W., Mendenhall, Miss.
Young, John O., 626 Clay St., Topeka, Kans.

APPLICATIONS FOR MEMBERSHIP

As in most other lines, 1931 was an off year as far as applications for membership were concerned. The total number listed in the twelve numbers of the JOURNAL published during 1931 was 194, the lowest number since 1925, when 139 applications were listed. Even the relatively small number of new members admitted during 1931 was sufficient to keep the total membership above the 1930 level. Although there is no direct relationship

between the number of new graduates and new members, it is interesting to observe that the figures for these two groups are fairly close. There were 207 graduates from the thirteen recognized veterinary colleges in the United States and Canada during 1931, against 194 applications for membership in the A. V. M. A.

Keep in mind the conditions under which applications are made. Here is the section from the By-laws covering same:

> Applications for membership shall be made upon blanks furnished by the Association, in the handwriting of the applicant, and must be endorsed by two members of the Association in good standing, one of whom must be a resident of the state, province or territory in which the applicant resides. Applications must be accompanied by a membership fee of $5.00 and dues pro rata for the balance of the fiscal year current, as stated on the application blank. Applications must be filed with the Secretary and examined by him for correctness and completeness as far as available information will allow. After such approval by the Secretary, the latter will cause to be published in the official JOURNAL, as soon thereafter as possible, said application with name and address of the applicant, college and year of graduation, and names of vouchers. If no objections shall be filed with the Secretary, as against the applicant being admitted to membership in the Association, his name shall again be listed in the next issue of the JOURNAL, and if no objections shall have been filed within thirty days after the second publication of the name of the applicant, he shall automatically become a member and shall be so enrolled by the Secretary and membership card issued. If any objections be filed against any applicant, either on first or second notice, said application will be referred to the Executive Board for consideration.

FIRST LISTING

BUCHANAN, W. S. Box 94, Tinley Park, Ill.
M. D. C., Chicago Veterinary College, 1910
Vouchers: C. E. Edmunds and Roy E. Willie

HEINSEN, EDWARD C. 422 Madison St., Port Clinton, Ohio
D. V. M., Ohio State University, 1931
Vouchers: W. F. Guard and W. R Krill.

JONESCHILD, EDWARD M. Livestock Sanitary Board, Helena, Mont.
D. V. M., State College of Washington, 1931
Vouchers: H. F. Wilkins and D. M. Warren.

PANISSET, MAURICE Oka, Quebec
M. V., Ecole Nationale Véterinaire (Alfort), 1924
Vouchers: Seymour Hadwen, Ronald Gwatkin and M. Gabriel

PRITCHARD, ROBERT M. Seabright, Santa Cruz, Calif.
B. S., D. V. M., State College of Washington, 1930
Vouchers: Donald E. Stover and W. L. Curtis.

SECOND LISTING

(See December, 1931, JOURNAL)

Aitkin, Howard M., 351 15th Ave., Columbus, Ohio.
Clarvoe, H. M., Artillery Field, Howard & Cass Sts., Tampa, Fla.
Harms, Herbert F., 223 Middletown Rd., Pearl River, N. Y.
Jones, Lloyd D., Rochelle, Ill.
Peters, James R., State Laboratories, Reynoldsburg, Ohio.

The amount which should accompany an application filed this month is $10.00, which covers membership fee and dues to January 1, 1933, including subscription to the JOURNAL.

COMING VETERINARY MEETINGS

California State Veterinary Medical Association and University of California Veterinary Conference. University Farm, Davis, Calif. January 4-7, 1932. Dr. W. L. Curtis, Secretary, 1264 W. 2nd St., Los Angeles, Calif.

Ohio State Veterinary Medical Association. Neil House, Columbus, Ohio. January 6-7, 1932. Dr. R. E. Rebrassier, Secretary, Ohio State University, Columbus, Ohio.

Pennsylvania, Conference of Veterinarians at University of. School of Veterinary Medicine, University of Pennsylvania, Philadelphia, Pa. January 6-7, 1932. Dr. G. A. Dick, Dean, 39th St. & Woodland Ave., Philadelphia, Pa.

Minnesota State Veterinary Medical Society. West Hotel, Minneapolis, Minn. January 7-8, 1932. Dr. C. P. Fitch, Secretary, University Farm, Saint Paul, Minn.

Maryland State Veterinary Medical Association. Medical Hall, 1211 Cathedral St., Baltimore, Md. January 8, 1932. Dr. E. M. Pickens, Secretary, College Park, Md.

Intermountain Livestock Sanitary Association. Hotel Bigelow, Ogden, Utah. January 11-13, 1932. Dr. H. J. Frederick, Secretary, Utah Agricultural College, Logan, Utah.

Wisconsin Veterinary Medical Association. Madison, Wis. January 11-13, 1932. Dr. B. A. Beach, Secretary, University of Wisconsin, Madison, Wis.

Virginia Polytechnic Institute, Conference for Graduate Veterinarians at. Blacksburg, Va. January 11-14, 1932. Dr. I. D. Wilson, Virginia Polytechnic Institute, Blacksburg, Va.

Chicago Veterinary Medical Association. Atlantic Hotel, Chicago, Ill. January 12, 1932. Dr. E. E. Sweebe, Secretary, 14th St. & Sheridan Road, North Chicago, Ill.

Kansas City Association of Veterinarians. Baltimore Hotel, Kansas City, Mo. January 12, 1932. Dr. J. D. Ray, Secretary, 1103 E. 47th St., Kansas City, Mo.

Rhode Island Veterinary Medical Association. Narragansett Hotel, Providence, R. I. January 12, 1932. Dr. G. L. Salisbury, Secretary, Wickford, R. I.

Iowa Veterinary Medical Association. Fort Des Moines Hotel, Des Moines, Iowa. January 12-15, 1932. (January 12-14 at Des Moines and January 15 at Ames.) Dr. C. J. Scott, Secretary, Knoxville, Iowa.

Maine Veterinary Medical Association. State House, Augusta, Me. January 13, 1932. Dr. L. E. Maddocks, Secretary, R. F. D. 2, Augusta, Me.

Southeastern Michigan Veterinary Medical Association. Detroit Mich. January 13, 1932. Dr. H. Preston Hoskins, Secretary, 537 Book Bldg., Detroit, Mich.

New Jersey, Veterinary Medical Association of. Jersey City, N. J. January 13-14, 1932. Dr. John G. Hardenbergh, Secretary, c/o Walker-Gorden Labs. Co., Plainsboro, N. J.

Tulsa County Veterinary Association. Tulsa, Okla. January 14, 1932. Dr. J. M. Higgins, Secretary, 3305 E. 11th St., Tulsa, Okla.

Cornell University, Annual Conference for Veterinarians at. Cornell University, Ithaca, N. Y. January 14-15, 1932. Dr. E. Sunderville, Secretary, Forest Home, Ithaca, N. Y.

Texas, State Veterinary Medical Association of. Dallas, Texas. January 15-16, 1932. Dr. D. Pearce, Secretary, Box 335, Leonard, Texas.

Indiana Veterinary Medical Association. Severin Hotel, Indianapolis, Ind. Week of January 17, 1932. Dr. R. H. Boyd, Secretary, 1422 N. Capitol Ave., Indianapolis, Ind.

Arkansas Veterinary Medical Association. Marion Hotel, Little Rock, Ark. January 18, 1932. Dr. W. C. Glockner, Secretary, 312 Gazette Bldg., Little Rock, Ark.

Oklahoma Veterinary Medical Association. Skirvin Hotel, Oklahoma City, Okla. January 18-19, 1932. Dr. C. H. Fauks, Secretary, 1919 W. Ash St., Oklahoma City, Okla.

Tennessee Veterinary Medical Association. Memphis, Tenn. January 19-20, 1932. Dr. A. C. Topmiller, Secretary, Box 238, Murfreesboro, Tenn.

Southern California Veterinary Medical Association. Chamber of Commerce Bldg., Los Angeles, Calif. January 20, 1932. Dr. E. E. Jones, Secretary, 1451 Mirasol St., Los Angeles, Calif.

South Dakota Veterinary Medical Association. Hotel Cataract, Sioux Falls, S. Dak. January 21-22, 1932. Dr. Geo. E. Melody, Secretary, Hoven, S. Dak.

Mississippi State Veterinary Medical Association. Clarksdale, Miss. January 21-22, 1932. Dr. C. B. Bradshaw, Secretary, Box 725, Jackson, Miss.

Michigan State College Short Course for Veterinarians. East Lansing, Mich. January 25-29, 1932. Dr. Ward Giltner, Dean, Division of Veterinary Science, Michigan State College, East Lansing, Mich.

Missouri Veterinary Medical Association and Special Course for Graduate Veterinarians. University of Missouri, Columbia, Mo. January 26-28, 1932. Dr. J. D. Ray, Secretary, 400 New Centre Bldg., Kansas City, Mo.

Keystone Veterinary Medical Association. Philadelphia, Pa. January 27, 1932. Dr. C. S. Rockwell, Secretary, 5225 Spruce St., Philadelphia, Pa.

Alabama Veterinary Medical Association and Short Course for Practitioners. Alabama Polytechnic Institute, Auburn, Ala. February 1-6, 1932. Dr. C. A. Cary, Secretary, Auburn, Ala.

Connecticut Veterinary Medical Association. Hotel Garde, Hartford, Conn. February 3, 1932. Dr. Edwin Laitinen, Secretary, 993 N. Main St., West Hartford, Conn.

New York City, Veterinary Medical Association of. Academy of Medicine, 5th Ave. and 103rd St., New York, N. Y. February 3, 1932. Dr. John E. Crawford, Secretary, 708 Beach 19th St., Far Rockaway, Long Island, N. Y.

Louisiana Veterinary Medical Association. Louisiana State University, Dalrymple Hall, Baton Rouge, La. February 8-9, 1932. Dr. H. A. Burton, Secretary, Alexandria, La.

Hudson Valley Veterinary Medical Society. Albany, N. Y. February 10, 1932. Dr. H. G. Wills, Secretary, Box 751, Albany, N. Y.

Kansas Veterinary Medical Association and Kansas State College Conference for Veterinarians. Manhattan, Kans. February 10-11, 1932. Dr. Chas. W. Bower, Secretary, 1128 Kansas Ave., Topeka, Kans.

Ohio State University, Conference for Veterinarians at. Ohio State University. Columbus, Ohio. March 23-25 1932. Dr. Oscar V. Brumley, Dean, Ohio State University, Columbus, Ohio.

STATE BOARD EXAMINATION

Arkansas Veterinary Examining Board. Old State House, Little Rock, Ark. January 19, 1932. Dr. J. H. Bux, Secretary, Old State House, Little Rock, Ark.

A STUDY OF INTESTINAL PARASITES IN HORSES AND MULES IN LOUISIANA, WITH SPECIAL REFERENCE TO THE CONTROL OF COLIC*

By HARRY MORRIS, *Baton Rouge, La.*

Animal Pathology Department,
Louisiana Agricultural Experiment Station

During the spring of 1925, a great many cases of colic occurred in the horses and mules on the University farm. Due to the centralization of the farming activities of the University on the new campus at Baton Rouge, the work animals were assembled from various localities. The sugar experiment station was moved from Audubon Park, New Orleans, to Baton Rouge. A number of mules were purchased on the open market.

The cases of colic were so numerous among these animals that an investigation was started concerning the cause and method of control by the Animal Pathology Department of the Louisiana Experiment Station. The following article is a report of this investigation

REVIEW OF LITERATURE

In a review of the literature concerning colics due to parasitic infestation, many articles have been written concerning thrombosis of the mesenteric vessels caused by an invasion of the larvae of the Strongylus. Hutyra and Marek[1] give an extensive survey on this subject as follows:

> Bollinger's investigations, which have been confirmed by other authors, have shown that from ninety to ninety-four per cent of all horses, with the exception of foals, have a verminous aneurysm. However, the statement of this author must be considered as entirely unjustified, that one-half of all fatal cases of colic are caused by thrombosis or aneurysm and that all cases in which colic appears suddenly and without apparent cause are due to this condition.

There seems to be a great difference of opinion concerning this point. Other authorities say that three-fourths of the cases of colic in horses and mules are thrombolic in origin. Authorities on the subject have stated that there was a lack of available information concerning parasitic infestation and colic as found under the average farm conditions.

METHOD OF PROCEDURE

The experiments were started in March, 1925, and continued to March, 1929, covering a period of four years. The work was

*Received for publication, June 25, 1931.

carried on through the coöperation of the sugar and cotton experiment farms. The sugar farm was on the alluvial soil adjoining the levee of the Mississippi River. The barn and mule lot was located about six hundred feet from the levee. Drainage conditions were about the average as found on a sugar plantation, except when the river was at flood stage or above. The cotton farm was bluff soil and well drained. The animals were of average condition, ranging in age from four to sixteen years. The same twenty-four mules and one saddle horse were used throughout the experiment. The animals were given excellent care. The feed consisted of corn, blackstrap molasses and alfalfa or soybean hay. The work was heavy and continuous. The heaviest work occurred in April and May, during the period of cultivation, and in November and December, during the period of harvesting. The sanitary conditions were above the average. The stables and lots were cleaned daily, and the manure was removed to the fields. Water was supplied in concrete troughs. When not being used, the animals were turned into small pastures adjoining the barn lots.

Tabulation of records: All cases were classified as colic where the animals showed symptoms of abdominal pain. Accurate records were kept of all such cases.

Weighing of animals: In order to obtain some definite information concerning the value of anthelmintic treatment for the control of intestinal parasites in mules, the animals were weighed at regular periods. The mules were weighed every Monday morning following the rest over the week-end. Before many weeks had passed it was found that much valuable information was being obtained and that the weights were an excellent index by which to judge the physical condition of the animals.

Diagnosis of parasitism: In order to determine the presence or absence of intestinal parasites, feces were collected from each animal and examined for parasite ova by the sugar precipitation method. Every animal used in the experiment showed the presence of *Strongylus* spp. and many unidentified ova. No ascarid ova were found.

Controls: Three mules of average condition were left untreated as controls. These mules had not shown symptoms of colic at the beginning of the experiment.

Methods of Treatment

Three methods of treatment for intestinal parasites were used during the course of the experiment.

During 1925, oil of chenopodium, as recommended by Hall,[2] was used. Animals were fasted for thirty-six hours, and then given oil of chenopodium, 16 to 20 cc in capsules, followed immediately by an aloes ball.

During 1926, carbon tetrachlorid, as recommended by Hall,[2] was used. The dose was 25 to 50 cc in capsules, with no purgative.

During 1927 and 1928, the antimony and potassium tartrate method, as recommended by Orchard[3] and many others, was used. The animals were not fasted. Eight grams of antimony and potassium tartrate, in capsules, was given for three consecutive days. An aloes ball was given on the fourth day.

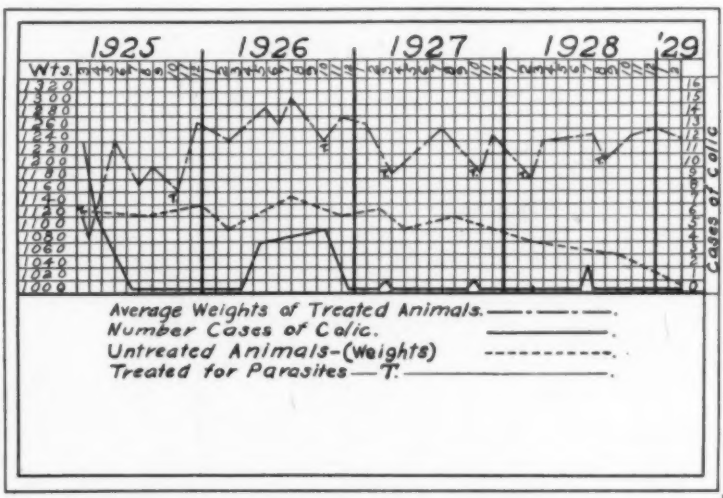

CHART 1. Graph showing average monthly weights of treated animals, time of each treatment and the number of cases of colic. Also the average monthly weights of the untreated or control animals.

The results obtained from the above treatment are given in chart 1. No symptoms of toxicity were noticed from the use of any of the drugs. Fecal examinations for parasite ova following all treatments indicated that probably the best results were obtained from the use of oil of chenopodium. Satisfactory results were obtained from the use of antimony and potassium tartrate and also carbon tetrachlorid, as shown by the chart. Bots were passed following the administration of carbon tetrachlorid.

As no deaths occurred among the animals treated during the four years of the experiment, there was no opportunity for post-mortem examination.

Discussion of Results

Chart 1 shows that during the month of March, 1925, or at the beginning of the experiment, twelve cases of colic occurred. At the time of the first treatment, the average weight was 1120 pounds per animal. The three control or untreated animals were of approximately the same average weight. Two weeks following treatment, the mules lost forty pounds in weight. Within two months following the first treatment, the mules made an average gain of 120 pounds, while the weights of the control mules re-

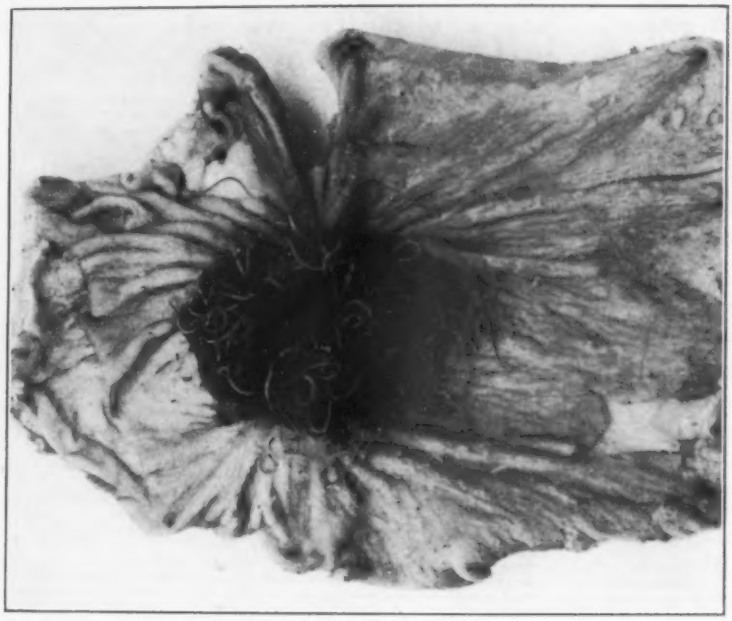

Fig. 1. Section of colon of horse showing lesion produced by the parasite, *Triodontophorus tenuicollis*. This specimen was obtained from the horse which was used in making a parasite survey.

mained unchanged. Following the first treatment, the chart shows a steady decline in the number of cases of colic until the month of July, when it dropped to zero.

The second treatment was given during the month of October, 1925. The treated animals showed a steady gain in weight until July, 1926, at which time they had obtained an average weight of 1310 pounds. Notwithstanding the fact that the mules were in almost perfect physical condition, the chart shows a gradual increase in the number of cases of colic. Five cases were reported during the month of October. The chart shows also that the

mules had not been treated for a period of twelve months. Following treatment it will be seen that the colic curve drops to zero in a short space of time. At this time it was decided to treat the animals semi-annually. The chart shows little variation in the average weights of the treated animals from this time until the end of the experiment. It also shows practically a complete control of colics, as only four cases occurred during a period of twenty-six months.

The chart shows a gradual decline in the weights of the untreated animals. One mule showed no symptoms of parasitism. The two other animals became so emaciated that they were unable to perform a day's work. These animals did not show any symptoms of colic. Fecal examination showed a very heavy infestation of intestinal parasites.

While it is difficult to draw conclusions concerning the value of worm control in work mules, from a study of the chart, it may be readily seen that 66⅔ per cent of the untreated animals were rendered useless for farm work, whereas the twenty-two treated mules were carrying a maximum labor load at the end of the four-year period.

Parasite Survey in Louisiana

In order to obtain some information concerning the parasites as found in the digestive tract of the horse and mule in Louisiana, two animals were posted and the macroscopic parasites were collected and sent to Dr. M. C. Hall, Chief of the Zoölogical Division, Bureau of Animal Industry, U. S. Department of Agriculture, for identification. The animals examined consisted of an aged horse and a seven-year-old mule. These animals had not been treated for parasites for a period of three years and had not been included in the experiment. The mule had been lame in the right posterior limb for a period of three years. Post-mortem showed the presence of an aneurysm in the femoral artery. Macroscopic examination did not show the presence of parasite larvae in the aneurysm. No other pathological lesions were found in the limb.

An attempt was made to collect the parasites from the different anatomical locations in the digestive tract. Each division was securely tied before it was removed from the abdominal cavity. Effort was made to separate the parasites by species. The following is the report furnished by Drs. Hall and Cram:

Horse

1. Ulcer on colon—*Triodontophorus tenuicollis*
2. Stomach (mucous membrane)—*Habronema microstoma*
3. Cecum—*Strongylus edentatus*
4. Cecum—*Strongylus vulgaris*
5. Cecum—*Cylicostomum* (*Cylicostomum*) *coronatum*
6. Cecum—larval forms (probably *Strongylus* sp.)
7. Abdominal cavity—*Setaria equina*
8. Stomach—*Gastrophilus intestinalis*
9. Large colon (posterior part)—*Cylicostomum* spp.
10. Large colon (posterior part)—*Triodontophorus tenuicollis*
11. Small colon—*Cylicostomum* (*Cylicocyclus*) *insigne*
12. Large colon (anterior part)—*Strongylus vulgaris*
    Triodontophorus tenuicollis
    Cylicostomum spp. (4 spp. at least)

Mule

13. Stomach (cardiac portion)—*Gastrophilus intestinalis*
14. Pylorus—*Gastrophilus nasalis*
15. Abdominal cavity—*Setaria equina*
16. Stomach (mucous membrane)—*Habronema muscae*
17. Stomach (mucous membrane)—immature *Habronema* sp. and a few Cylicostomes.
18. Large colon—*Cylicostomum* spp.
19. Cecum—*Probstmayria vivipara*
20. Cecum—*Cylicostomum* spp.
21. Cecum—*Strongylus vulgaris*
22. Cecum—*Strongylus edentatus*
23. Large colon—*Cylicostomum* spp.
24. Small colon—*Cylicostomum* spp.

Dangers Encountered in Treating Horses and Mules for Worms

Treating horses and mules for intestinal parasites is accompanied by many dangers and should always be under the direct supervision of a competent veterinarian. The veterinarian should recommend and administer the anthelmintics. The drugs used for the removal of intestinal parasites, as a rule, are very toxic and should be given according to the best known methods of administration. Even when these precautions are taken, quite often the treatment proves fatal to very young animals or to animals in very poor physical condition. Notwithstanding the

fact that no bad results were encountered during a period of four years as reported in this work, reports showed that fatalities are often encountered. Every precaution possible should be observed in treating mules for parasites because one fatality will often interfere with future control measures that should be put into operation on every farm.

Summary

From a study of the above report the following conclusions might be drawn:

1. Results seem to indicate that colic in horses and mules may be practically eliminated from the average Louisiana farm by practicing parasite control.

2. In order to obtain desirable results, all animals should be treated semi-annually. In animals showing persistent colic, it is recommended that treatment be repeated within one month.

3. To eliminate fatal results as far as possible, treatment should be administered under the direct supervision of a veterinarian.

4. Barnyard sanitation assists materially in parasite control.

5. A limited survey shows the average Louisiana horse and mule to harbor many species of internal parasites.

6. It has been demonstrated beyond the shadow of a doubt that the efficiency of the animals was increased by the practice of parasite control.

Acknowledgments

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SECOND REPORT ON THE CALMETTE-GUERIN METHOD OF VACCINATING ANIMALS AGAINST TUBERCULOSIS*

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In a previous report,[1] the results of more than four years' studies of the Bacillus Calmette-Guérin (*BCG*) were described. These results were summarized as follows:

> B.C.G. was shown to be a mammalian tubercle bacillus of very low virulence, if not avirulent.
>
> Immunization experiments in guinea pigs showed a marked prolongation of life in animals treated with B.C.G. over untreated animals, when both groups were subjected to tuberculous exposure. Vaccination did not result in immunity, however, as every vaccinated animal died eventually of tuberculosis.
>
> Cattle vaccinated with B.C.G., with an equal number of controls, were exposed to tubercle bacilli by intravenous injection, subcutaneous injection, feeding, and contact with known tuberculous animals. In the group where exposure was made by feeding virulent tubercle bacilli, the vaccinated cattle showed more extensive lesions, as a whole, than the unvaccinated. In the other three groups, resistance to the localization and generalization of tuberculosis was slightly more manifest in the vaccinated than in the unvaccinated animals, but in no group was there manifest an immunity as measured by the prevention of infection. Thus, vaccination with B.C.G. does not appear to prevent virulent tubercle bacilli from entering the body and establishing foci of infection, but merely inhibits the extension of tuberculous processes.

In this report, three groups of bovine animals are described: (1) one of animals born and maintained in a tuberculous environment, and vaccinated subcutaneously with *BCG* at birth and yearly thereafter; (2) one group of animals born and maintained in a tuberculous environment and vaccinated by mouth with *BCG* at birth; and (3) one group of calves vaccinated by mouth with *BCG* at birth and placed in a tuberculous environment several months later. The results of these three experiments, which will be described in full, tend to strengthen the conclusions summarized in the first report.

In the previous report, some doubt was expressed as to the entire lack of virulence of *BCG* for guinea pigs, as one of 48 died of generalized tuberculosis one year after being inoculated with a culture of *BCG*. Since tuberculous guinea pigs had been kept at intervals in the same house with the *BCG*-treated guinea pigs, the possibility of "spontaneous" tuberculosis could not be excluded. Another group of similarly treated guinea pigs has been kept for two years in an environment free from tuberculosis,

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and the results of this test, described hereinafter, will show the apparent innocuousness of *BCG* for guinea pigs.

Exposure Field

The exposure field was of approximately three acres in area, rolling and partly wooded, with one common drinking-vat holding about 100 gallons of water. Mill feed was fed in boxes on the ground, and hay in outside racks. There was one common shelter, covered, and open to the south. The animals were free at all times. The young animals were fed mill feed separately from the older animals in order to avoid injury to the former due to pushing and butting.

Exposure Animals

Four adult, tuberculous cows were placed in this field to provide exposure, only one of which was expelling tubercle bacilli in its feces. This animal died of generalized tuberculosis about one month before all vaccinated and control animals were removed from exposure.

Vaccination Experiments in Bovines

Group I: Repeated subcutaneous vaccinations with *BCG.*

Six calves born in a tuberculous environment during the course of previous *BCG* tests; three were vaccinated subcutaneously with *BCG* during the first ten days of life and yearly thereafter and the remaining three were left untreated as controls. (See table I.)

Protocols

Calf 1379: Heifer, born July 22, 1926. Vaccinated under skin of dewlap with 100 mg. of *BCG*, July 22, 1926; revaccinated July 21, 1927, with 90 mg. of *BCG* and July 24, 1928, with 100 mg. of *BCG.*

Removed from exposure to tuberculosis, December 20, 1929.

January 5, 1931, gave a positive reaction to the intradermal injection of tuberculin.

January 8, 1931, condition fair; killed.

Postmortem findings: Both retro-pharyngeal glands greatly enlarged, irregular in outline, and broken down, with yellow creamy pus. Left submaxillary gland contained one 6-mm. tubercle. Left bronchial gland 6 cm. x 7 cm., massed with tubercles, slightly granular. Right bronchial gland slightly enlarged; a few small tubercles. Anterior mediastinal glands slightly enlarged; a few small tubercles. Posterior mediastinal glands 13 cm. x 6 cm., tuberculous throughout, tubercles being slightly granular. Numerous small, cheesy tubercles scattered through anterior and median lobes of left lung. Left posterior lobe showed a 10-cm. mass of multilocular tubercles filled with thick, creamy pus. Posterior lobe of right lung contained six tubercles, each about 2.5 cm. in diameter, firm and granular on incision. Eight mesenteric glands contained tubercles ranging from 0.5 cm. to 4 cm. in diameter, the larger being slightly calcified. Liver showed 2 tubercles, one 0.4 cm. and one 1 cm. in diameter.

TABLE I—*Data on six bovines, born in tuberculous environment; three vaccinated subcutaneously with BCG at birth and yearly thereafter, and three left as controls*

ANIMAL	BORN	VACCINATED SUBCUTANEOUSLY IN DEWLAP	*BCG* (MG.)	REMOVED FROM EXPOSURE	OUTCOME AND POSTMORTEM FINDINGS
1379	July 22, 1926	July 22, 1926 July 21, 1927 July 24, 1928	100 90 100	Dec. 20, 1929	Killed, Jan. 8, 1931. Extensive lesions of tuberculosis in pharyngeal, submaxillary, bronchial, mediastinal, and mesenteric lymph-glands, lungs and liver
1378	Aug. 20, 1926	Aug. 26, 1926 Aug. 29, 1927 Sept. 7, 1928	90 100 100		Killed, Nov. 23, 1929, on account of viciousness. Slight lesions of tuberculosis in submaxillary, bronchial, mediastinal and mesenteric lymph-glands, and lungs
1387	Jan. 16, 1927	Jan. 16, 1927 Jan. 15, 1928 Jan. 8, 1929	100 100 100	Dec. 20, 1929	Killed, Jan. 7, 1931. Extensive lesions of tuberculosis in pharyngeal, bronchial, mediastinal, portal and mesenteric lymph-glands, lungs and liver
1377	Dec. 30, 1925	Control	—	Dec. 20, 1929	Moribund when killed, May 1, 1930. Emaciated. Extensive lesions of tuberculosis in pharyngeal, bronchial, mediastinal, portal and mesenteric lymph-glands, lungs, liver and meninges of brain and spinal cord
1380	Oct. 13, 1926	Control on 1378	—		Killed, Dec. 15, 1929. Slight lesions of tuberculosis in pharyngeal, bronchial and mediastinal lymph-glands, and lungs
1388	Dec. 31, 1926	Control on 1387	—	Dec. 20, 1929	Killed, Jan. 6, 1931. Extensive lesions of tuberculosis in pharyngeal, prepectoral, bronchial and mediastinal lymph-glands and lungs

At the site of the injections of *BCG*, there remained only a thin layer of white fibrous connective tissue, the tumors which developed following each vaccination having resolved.

Guinea-pig inoculations of tuberculous lesions were positive for tuberculosis.

Calf 1378: Male, born August 20, 1926. Vaccinated under skin of dewlap with 90 mg. of *BCG*, August 26, 1926; revaccinated August 29, 1927, with 100 mg. of *BCG*, and September 7, 1928, with 100 mg. of *BCG*.

This animal had become vicious and injured younger animals. Therefore, it was killed on November 23, 1929. Condition good.

Postmortem findings: One submaxillary gland contained several tubercles 3 mm. in diameter; bronchial and posterior mediastinal glands each contained several tuberculous foci 1 to 3 mm. in diameter. One mesenteric gland contained a 3-mm. tuberculous focus. Left posterior lobe of lungs contained one tubercle 1 cm. in diameter; right posterior lobe showed a tuberculous area 2 cm. x 3 cm., broken down, and another smaller firm nodule of more recent origin.

Guinea-pig inoculations of tuberculous lesions were positive for tuberculosis.

Calf 1387: Male, born January 16, 1927. Vaccinated under skin of dewlap with 100 mg. of *BCG*, January 16, 1927; revaccinated January 15, 1928, with 100 mg. of *BCG* and January 8, 1929, with 100 mg. of *BCG*.

December 20, 1929, removed from exposure to tuberculosis with other vaccinated animals.

January 5, 1931, gave a positive reaction to the intradermal injection of tuberculin.

January 7, 1931, condition good; killed.

Postmortem findings: Right retropharyngeal gland 7 cm. in diameter and tuberculous throughout. All bronchial and mediastinal glands enormously enlarged, irregular, and tuberculous throughout, the lesions being mostly firm but some soft and caseous. Entire left lung practically massed with tubercles ranging in size up to 3 cm. in diameter, some slightly broken down and some firm and caseous. About one-half area of posterior lobe of right lung contained masses of soft to caseous tubercles ranging in size up to 2 cm. in diameter. Liver contained one 1-cm. tubercle. All portal glands enlarged and contained eight 1-cm. tubercles, one slightly calcified, the others caseous. Practically entire chain of mesenteric glands contained one or more tubercles from 0.5 cm. to 1 cm. in diameter.

Guinea-pig inoculations of tuberculous lesions were positive for tuberculosis.

A vaccinal tumor, 5 cm. in diameter, still present at autopsy. The tumor consisted of a dense capsule of white fibrous connective tissue; about 8 grams of thick, yellow, creamy pus were removed from center of mass. Poorly staining acid-fast bacilli were found in pus.

Six guinea pigs were injected intra-abdominally each with 1 cc of an emulsion of equal parts of the broken down tissue from the interior of the vaccinal tumor and salt solution. Four months later these six animals were tested intradermally with tuberculin without reaction. About six weeks later, or 5½ months after injection, one of these guinea pigs died. It was in fairly good condition but on autopsy showed extensive lymphadenitis, especially of the paratracheal, axillary, inguinal and sublumbar lymph-glands; the liver was swollen and slightly roughened; the spleen was greatly enlarged, both ends being smooth and swollen while the central area was a pale yellow and slightly contracted; the lungs had a drowned appearance, there being about 5 cc of clear fluid in the thoracic cavity. No acid-fast organisms were observed in smears made of lymph-glands. Eight guinea pigs were inoculated with sections of various glands and liver. If any condition simulating tuberculosis develops in these guinea pigs or in the five remaining from the original lot, it will be made the subject of a further communication.

Control 1377: Heifer, born December 30, 1925. This animal was the first born in the tuberculous environment and was not treated.

December 15, 1926, tested intradermally with tuberculin without reaction.

December 20, 1929, removed from tuberculous environment.

April 30, 1930, down and in a moribund condition; killed. Had been in very poor condition for a long time. Held her head to one side and at times had slight nervous disturbances and finally lost use of hind quarters.

Postmortem findings: Very much emaciated. One retropharyngeal lymph-gland enlarged and tuberculous; one of the prescapular glands contained a few small tubercles; lungs contained 8 caseous tuberculous masses from 2 cm. to 5 cm. in diameter and a few smaller ones, these nodules being well encapsulated and confined for the most part to the principal lobes; bronchial and mediastinal glands slightly enlarged and tuberculous; liver contained a multilocular tuberculous mass about 5 cm. in diameter, the loculi of this mass being separated by dense connective tissue bands; four of the mesenteric glands contained tuberculous areas but the glands were only slightly enlarged. Meninges covering parts of the cerebellum, the medulla oblongata and upper portion of the cord studded on inner surface with many tubercles from 0.5 to 4 mm. in diameter; a tubercle about 4 mm. in diameter at the roots of one of the pairs of spinal nerves; surface of ventricles of brain also studded with a considerable number of tubercles from 1 to 3 mm. in diameter. Meninges of spinal cord in lumbar region normal. Smear preparations from meningeal lesions showed the presence of acid-fast bacilli and guinea-pig inoculations of meningeal lesions were positive for tuberculosis.

Control calf 1380: Male, born October 13, 1926, in tuberculous environment. Not treated. Killed, December 15, 1929, as a check on bovine 1378. Condition good.

Postmortem findings: One retropharyngeal gland contained a minute tuberculous focus; right bronchial gland about three times normal size and contained three tuberculous caseous masses, each 2 cm. to 2.5 cm. in diameter; left bronchial gland contained a tuberculous lesion 1 x 2 cm.; one anterior mediastinal gland contained one small focus, and posterior mediastinal gland contained a caseous tuberculous mass 3 x 6 cm. in diameter; one 1-cm. tubercle in lungs, contents soft. Guinea-pig inoculations of tuberculous lesions were positive for tuberculosis.

Control 1388: Female, born December 31, 1926; placed in exposure field, January 16, 1927, with its mother, as control on calf 1387. Not treated.

December 20, 1929, removed from tuberculous environment.

January 5, 1931, gave a positive reaction to the intradermal injection of tuberculin.

January 6, 1931, condition fair; killed.

Postmortem findings: Both retropharyngeal glands greatly enlarged, each containing about 15 cc of yellow, creamy pus; prepectoral glands enlarged, firm, tuberculous throughout; all bronchial and mediastinal glands greatly enlarged, firm, and tuberculous throughout; right anterior lobe of lungs consolidated, irregular in outline and adherent to pleura; practically three-fourths of the parenchyma of median lobes tuberculous, lesions being firm but not calcified; both posterior lobes tuberculous throughout.

Guinea-pig inoculations of tuberculous lesions were positive for tuberculosis.

ORAL VACCINATION

Group II: Six calves born in tuberculous environment, three vaccinated by feeding *BCG* during first few days of life, and three left untreated as controls. (See table II.)

PROTOCOLS

Calf 1468: Female, born July 28, 1928; received three feedings of 120 mg. of *BCG* each on July 30, August 2 and August 4, 1928, respectively.

December 20, 1929, removed from tuberculous exposure.

TABLE II—*Data on six bovines, born in tuberculous environment; three vaccinated by mouth with BCG and three kept as controls*

ANIMAL	BORN	VACCINATED BY MOUTH	*BCG* (MG.)	REMOVED FROM EXPOSURE	OUTCOME AND POSTMORTEM FINDINGS
1468	July 28, 1928	July 30, 1928 Aug. 2, 1928 Aug. 4, 1928	120 120 120	Dec. 20, 1929	Killed, Jan. 9, 1931. Slight lesions of tuberculosis in left retropharyngeal and left bronchial lymph-glands
1473	July 31, 1928	Aug. 2, 1928 Aug. 4, 1928 Aug. 6, 1928	120 120 120	Dec. 20, 1929	Killed, Jan. 8, 1931. Well-marked lesions of tuberculosis in retropharyngeal, bronchial, mediastinal, mesenteric lymph-glands, and lungs
1574	Dec. 5, 1928	Dec. 8, 1928 Dec. 10, 1928 Dec. 13, 1928	120 120 120	Dec. 20, 1929	Killed, Jan. 9, 1931. Slight lesions of tuberculosis in retropharyngeal and bronchial lymph-glands and lungs
1467	July 5, 1928	Control	—	Dec. 20, 1929	Died, June 20, 1930. Lead poisoning. Slight lesions of tuberculosis in retropharyngeal, bronchial and mediastinal lymph-glands
1470	Aug. 10, 1928	Control	—	Dec. 20, 1929	Killed, Jan. 7, 1931. Slight lesions of tuberculosis in mediastinal, bronchial and mesenteric lymph-glands
1575	Jan. 16, 1929	Control	—	Dec. 20, 1929	Died, July 25, 1930. Lead poisoning. Tuberculosis of lungs and mediastinal lymph-glands

February 2, 1930, gave a positive reaction to intradermal injection of tuberculin.

January 5, 1931, gave a positive reaction to intradermal injection of tuberculin.

January 9, 1931, condition good; killed.

Postmortem findings: Four 3-mm. tubercules in left retropharyngeal gland and one 3-mm. tubercle in left bronchial gland. Guinea-pig inoculations of tuberculous lesions were positive for tuberculosis.

Calf 1473: Female, born July 31, 1928; received three feedings of 120 mg. of *BCG* each on August 2, 4, and 6, 1928, respectively.

December 20, 1929, removed from tuberculous exposure.

February 10, 1930, gave a positive reaction to intradermal injection of tuberculin.

January 5, 1931, gave a positive reaction to intradermal injection of tuberculin.

January 8, 1931, condition good; killed.

Postmortem findings: Right retropharyngeal gland enormously enlarged, tuberculous throughout, filled with creamy, yellow pus; left bronchial gland contained one 1-cm. tubercle, broken down; anterior mediastinal gland contained two 1-cm. tubercles, firm, slightly granular; posterior mediastinal gland contained one 4-cm. tubercle, firm, slightly granular; left posterior lobe of lung contained one 2-cm. tubercle filled with soft, creamy pus; one mesenteric gland contained a cheesy tubercle 1 cm. in diameter. Guinea-pig inoculations of tuberculous lesions were positive for tuberculosis.

Calf 1574: Male, born December 5, 1928; received three feedings of 120 mg. of *BCG* each on December 8, 10 and 13, 1928, respectively.

December 20, 1929, removed from tuberculous environment.

February 10, 1930, reacted to an intradermal injection of tuberculin.

January 2, 1931, reacted to an intradermal injection of tuberculin.

January 9, 1931, killed.

Postmortem findings: Left retropharyngeal gland contained one 3-mm. tubercle; right bronchial gland enlarged, contained two tubercles each about 2 cm. in diameter, firm and slightly granular. Left bronchial gland contained one 3-mm. tubercle; anterior and median lobes of right lung contained three 0.5-cm. tubercles. Guinea-pig inoculations of tuberculous lesions were positive for tuberculosis.

Control calf 1467: Male, born July 5, 1928.

December 20, 1929, removed from exposure to tuberculosis.

February 10, 1930, gave a positive reaction to intradermal injection of tuberculin.

June 20, 1930, died of lead poisoning.

Postmortem findings: On autopsy showed slight lesions of tuberculosis in retropharyngeal, bronchial and mediastinal lymph-glands.

Control calf 1470: Female, born August 10, 1928.

December 20, 1929, removed from exposure to tuberculosis.

February 10, 1930, gave a positive reaction to intradermal injection of tuberculin.

January 5, 1931, gave a positive reaction to intradermal injection of tuberculin.

January 7, 1931, killed.

Postmortem findings: Three 1.5-cm. firm tubercles each in anterior and posterior mediastinal glands; two 1-cm. tubercles in left bronchial gland; two 8-mm. slightly calcified tubercles in mesenteric glands. Guinea-pig inoculations of tuberculous lesions were positive for tuberculosis.

Control calf 1575: Female, born January 16, 1929.

December 20, 1929, removed from tuberculous environment.

February 10, 1930, gave a positive reaction to an intradermal injection of tuberculin.

July 25, 1930, died of lead poisoning.

TABLE III—*Data on four calves placed in tuberculous environment when weaned; two vaccinated by mouth with BCG at birth and two untreated controls*

ANIMAL	BORN	VACCINATED BY MOUTH	*BCG* (MG.)	PLACED IN TUBERCULOUS ENVIRONMENT	REMOVED FROM TUBERCULOUS ENVIRONMENT	OUTCOME AND POSTMORTEM LESIONS
1476	Sept. 29, 1928	Oct. 1, 1928 Oct. 3, 1928 Oct. 5, 1928	120 120 120	Jan. 30, 1929	Dec. 20, 1929	Killed, Jan. 9, 1931. Slight lesions of tuberculosis in bronchial, mediastinal, and mesenteric lymph-glands, and lungs
1517	Nov. 21, 1928	Nov. 22, 1928 Nov. 24, 1928 Nov. 26, 1928	120 120 120	April 15, 1929	—	Died, Nov. 22, 1929. Injured by vicious bull. Lesions of tuberculosis in bronchial lymph-glands
1520	Dec. 1, 1928	Control	—	April 22, 1929	Dec. 20, 1929	Died, July 26, 1930. Lead poisoning. Caseocalcareous lesions of tuberculosis in posterior mediastinal lymph-glands
1523	Dec. 22, 1928	Control	—	April 22, 1929	—	Died, Oct. 18, 1929. Probably injured by vicious bull. One retropharyngeal lymph-gland enlarged and tuberculous throughout

Postmortem findings: Lungs contained about 12 tubercles from 1 to 3 cm. in diameter, and tuberculous areas were present in mediastinal glands.

Group III: Four calves, two vaccinated by mouth at birth and two unvaccinated controls; placed in tuberculous environment when weaned. (See table III.)

PROTOCOLS

Calf 1476: Male, born September 29, 1928; received three feedings of 120 mg. of *BCG* each on October 1, 3 and 5, 1928.
January 30, 1929, placed in tuberculous environment.
December 20, 1929, removed from tuberculous environment.
February 10, 1930, reacted to an intradermal injection of tuberculin.
January 5, 1931, reacted to an intradermal injection of tuberculin.
January 9, 1931, killed.

Postmortem findings: Left bronchial gland contained one 2.5-cm. tubercle filled with creamy, yellow pus; posterior mediastinal gland, three 0.5-cm. cheesy tubercles; left posterior lobe of lungs contained one 3-cm. tubercle, and right posterior lobe two 3-cm. tubercles, all broken down, with creamy, yellow pus. One 8-mm. cheesy tubercle in a mesenteric gland. Guinea-pig inoculations of tuberculous lesions were positive for tuberculosis.

Calf 1517: Male, born November 21, 1928; received three feedings of 120 mg. of *BCG* each on November 22, 24 and 26, 1928.
April 15, 1929, placed in tuberculous environment.
November 22, 1929, found dead; probably injured by vicious bull in same field.

Postmortem findings: One bronchial gland contained about 12 tuberculous foci from 1 to 2 mm. in diameter; another small gland associated with lungs contained a minute focus. Guinea-pig inoculations of lesions were positive for tuberculosis.

Calf 1520: Male, born December 1, 1928.
April 22, 1929, placed in tuberculous environment as a control on calves 1476 and 1517.
December 20, 1929, removed from tuberculous exposure field.
February 10, 1930, reacted to an intradermal injection of tuberculin.
July 26, 1930, died of lead poisoning.

Postmortem findings: Caseocalcareous lesions of tuberculosis were found in posterior mediastinal glands.

Calf 1523: Male, born December 22, 1928.
April 22, 1929, placed in tuberculous environment as a control on calves 1476 and 1517.
October 18, 1929, found dead, probably injured by vicious bull.

Postmortem findings: One retropharyngeal gland two to three times normal size and largely converted into a tuberculous mass.

SECOND VIRULENCE TEST IN GUINEA PIGS

In the first test of virulence of *BCG* in guinea pigs, previously reported, one of a group of 48 died of generalized tuberculosis one year after inoculation. As guinea pigs affected with tuberculosis were kept at intervals in the same house, the possibility of "spontaneous" tuberculosis could not be excluded.

In order to obtain more definite information on this subject, a second test of virulence in guinea pigs was made in February, 1929, 40 guinea pigs being inoculated intraperitoneally and 40 subcutaneously, each with 5 mg. of a culture of *BCG* grown on

Sauton's medium. These animals were placed in a house which has never been used for tuberculosis and were cared for by helpers who did not come in contact with animals affected with tuberculosis. In February, 1931, or two years after inoculation, all of the guinea pigs surviving were killed. None showed lesions of tuberculosis. Of those animals which died of intercurrent disease, none showed lesions of progressive tuberculosis. In all cases where lesions simulating tuberculosis were observed, subinoculations were made into normal guinea pigs. The latter were killed after various intervals but none became affected with tuberculosis.

This test shows that the strain of *BCG* in our possession, which has been cultured on potato medium and Sauton's liquid medium in accordance with Calmette's directions, is avirulent. No attempt has been made to revive its virulence other than by grinding vaccinal lesions and injecting this emulsion into normal guinea pigs.

Discussion

At the time these investigations were started Calmette was attempting to determine whether or not tuberculosis could be eradicated from an infected herd in five years by vaccinating all newborn animals within the first ten days of life and yearly thereafter, all animals living in cohabitation. Calmette[2] now advocates the segregation of the newborn for a period of one to two months following vaccination.

One of the criticisms by Calmette of the first series of investigations made at this station in *BCG* vaccination was that the animals were killed too soon (within one year after vaccination). He stated that if the vaccinated animals had been allowed to live, the lesions would have resolved. This criticism did not seem justifiable since, if an agent could not prevent tuberculosis from being so extensively established as was the case in our first vaccinated animals, it would appear illogical that the continued use of the same agent would tend to resolve the lesions, especially when exposure is continued. The idea of revaccination itself seems to be a contraindication, since vaccinated animals, in our experience, invariably contract tuberculosis when exposed naturally or artificially, and one of the chief tenets of Calmette is that only animals free from tuberculosis should be vaccinated.

Positive evidence on the question of resolution of tuberculous lesions was obtained in the experiment described in the protocols

of group I (table I). Two revaccinated animals and two controls, following an exposure of approximately three years, were removed to fields free from exposure, the vaccinated being placed in one enclosure and the controls in another. They were allowed to live one year under these conditions to allow sufficient time for resolution to take place. As shown in the protocols, both revaccinated animals showed extensive lesions of generalized tuberculosis, with no evidence of resolution.

Groups II and III, vaccinated by mouth, were added to determine if oral vaccination, which is the method advocated by Calmette in the vaccination of children, would cause a resistance to infection under natural exposure. The only difference between group II and group III was that the animals in group II were born in the exposure field, while group III was composed of calves of normal cows, vaccinated by mouth at birth and placed under exposure, with an equal number of controls, when four months old. These animals were removed from exposure after 8 to 12 months and kept under normal conditions for one year. All showed lesions of tuberculosis at autopsy. There was practically no difference in the extent or amount of disease between the vaccinated and controls, nor was there any evidence of resolution of the lesions in the vaccinated animals.

The case of lymphadenitis which developed in one of six guinea pigs inoculated intra-abdominally with material from the vaccinal lesion of bovine 1387, is of especial interest. This condition appears to be similar to lesions caused in guinea pigs by the filtrable form of the tubercle bacillus as described by Calmette and Valtis.[3] Investigation of this phase will be continued in order to determine if, by sub-inoculation from guinea pig to guinea pig, an acid-fast can be recovered. If an acid-fast is recovered, it will be interesting to learn whether the organism will have the characteristics of *BCG* or of the parent organism from which *BCG* was originally obtained.

Several animals died of lead poisoning after being removed from tuberculous exposure. These had been fed grass cut from around buildings painted with a sprayer. This grass had evidently adsorbed sufficient paint to cause lead poisoning. This incident interfered to some extent in the comparison of the extent of lesions in groups II and III between the animals vaccinated by mouth and their controls, as three of the controls died six months before the principals were killed.

The treatment of disease in man is necessarily different from the treatment of disease in domestic animals. Any agency which will prolong human life is hailed as a welcome addition to the armamentarium in combating disease. The economic value of domestic animals, however, does not warrant the preservation of an individual or group of animals when affected with any condition which permanently affects their usefulness, or has a bearing on the health of other animals or on the public health. Tuberculosis in animals has been proven to be not only a menace with regard to the public health but is a most serious drain on cattle and dairy industries. Hence the policy of the Bureau of Animal Industry with regard to tuberculosis in animals is not to endeavor to prolong the life of a tuberculous animal, which the tests made at this station clearly indicate is all that could be hoped for from the use of the *BCG* vaccine, but rather to detect the presence of tuberculosis by means of the tuberculin test as early as possible in order that this disease may be eradicated in the United States.

Summary and Conclusions

1. The strain of *BCG* which has been in our possession for seven years and cultured in accordance with the directions of Calmette has been uniformly avirulent for guinea pigs.

2. The investigations of *BCG* vaccination of cattle, described in this report, corroborate the conclusions drawn from our earlier investigations that *BCG* vaccination, at best, merely inhibited the progress of tuberculous processes, and further show that the lesions of tuberculosis, once established in vaccinated animals, do not tend toward retrogression.

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Special Course for Missouri Veterinarians

The Missouri Veterinary Medical Association will coöperate again with the Veterinary Department of the University of Missouri in giving a special course for graduate veterinarians, at Columbia, Mo., January 26-27-28, 1932, according to an announcement made by Dr. J. D. Ray, secretary of the Missouri Association.

NON-PARASITIC SKIN DISEASES OF DOGS*

By E. C. KHUEN, *Chicago, Ill.*

The skin is the natural protective covering of the body and as such is a very complex organ. Its diseases are many and difficult to recognize as well as treat. It follows, therefore, that a thorough understanding of the anatomy and physiology of the skin is essential if much information is to be gained as to the etiology, diagnosis and pathology of the myriad morbid processes to which the integument is heir.

Physical characteristics are easily apparent when we consider the texture and thickness of the skin at different points of the organism. An example may be cited in observing the skin covering the eyelids and thighs as compared to that covering the back. While we may look upon skin as skin, it does not pay dividends to treat it as such. A medicament that may be well tolerated on the thick parts of the integument may prove highly irritating to the thinner portions.

The anatomy of the skin is rather complex and plays a most important part both in the physiology and pathology of this organ. Therefore, it is of primary concern that one's knowledge covering the treatment of the morbid skin processes must be based on a solid foundation. This concrete foundation may be considered anatomy.

Accordingly, let us refer briefly to the make-up of the integument. Sisson states:

> The skin varies greatly in thickness in the different breeds. The coat, likewise, shows an extreme variation in length, thickness, color, etc. The sebaceous glands are best developed in the short- and rough-haired breeds, and largest and most numerous at the lips, anus, dorsal surface of the trunk, and sternal region. The sweat-glands are relatively better developed in the long- and fine-haired breeds. The largest are found in the digital pads. Coil glands occur in the skin of the perineum and paranal pouches. In the muzzle, glands are absent or very scanty.

It has been mentioned by Trautman that "the lateral nasal gland supplies the secretion on the muzzle." The nails and pads are classified as appendages and will not be discussed.

Physiologically, the skin is the thickest where the chance of injury is the greatest, while in those parts where sensibility is most required it is thinnest.

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The skin is an organ of touch and all animals appear most sensitive to even slight skin irritation due to the wide distribution of sensory nerves.

In addition to its protective and sensory functions, the skin has other duties to perform such as stabilizing surface temperature, throwing off body wastes through excretory glands, absorbing various bodies, etc. The fact that absorption does take place through the skin is of importance both from an etiologic and a therapeutic standpoint.

If there is any branch of veterinary medicine in which nearly everything depends upon an accurate diagnosis, it is dermatology. It is requisite that the clinician must be exacting, observing, critical and a discriminator of color, form and size. In order to develop these qualities it follows that a systematic method of examination must be adopted and followed out in practice.

A prerequisite to capitalizing on the foregoing is a good light —diffused sun-light is the only one that can be relied upon.

The diagnosis made by a client should never be accepted, as it is usually wrong. By refusing to consider it and by making a thorough and careful examination, the habit of jumping at conclusions is avoided. Further, it is far more impressionable on the client and aborts the possibility of the pet-owner broadcasting the statement: "I bought skin medicine from Dr. So and So and it was no good."

Naturally microscopic examination of skin scrapings is of value particularly in differential diagnosis. Frequently, an unsuspected complication is discovered which has interfered with a frank diagnosis or a rational treatment.

In common with other organs the diagnosis of skin diseases involves extremes, and the nature of the trouble may be concluded easily, or prove next to impossible. This much is certain —it is necessary to be well grounded in the various branches of general medicine in addition to having a wide knowledge of the various dermatoses if an accurate diagnosis is to be consummated. With this thought in mind we must be on the alert to differentiate infectious diseases involving cutaneous eruptions as well as dermatoses associated with internal parasitism from skin disorders proper. In this connection the use of the thermometer and microscope may well be worked over-time before drawing conclusions.

Many classifications of dermatoses have been advanced by numerous dermatologists. Each has its advantages and dis-

advantages, regardless of the basis used in compiling a scientific arrangement. For all practical purposes the veterinary profession must of necessity follow along with what we may term a practical guide. Let us hope that the research field will give this phase of veterinary pathology more attention in the near future.

Frankly, the pathology of skin diseases is, in reality, general pathology localized upon the tissues of one organ. As might be expected, inflammation is one of the most important pathological processes observed. No less interesting than inflammations are the neoplasms, both malignant and benign. They form a large class of diseases but we shall forego discussion of this phase of dermic pathology at this time.

The treatment of skin diseases should include treatment of local as well as general causes. In view of this it may be easily understood that to neglect subjecting a patient to a general examination often leads to absolute failure in overcoming a cutaneous disorder.

There are many drugs that may be used internally but each has its use and limitations. Among these should be mentioned calcium, iron, sulphur, saline purgatives, arsenic and potassium iodid. In this connection, there is a fact that should always be remembered—arsenic is not the universal panacea which many think it is in the treatment of skin troubles. The same may be stated for iodid of potassium.

Glandular therapy warrants further investigation before definite conclusions are formed. In obstinate cases we should consider this phase of medication.

Local applications used in treating the various affections are of different kinds. These include dusting powders, lotions and ointments containing agents that may be antipruritic, antiseptic, astringent, and so forth. Soap and water are used essentially as cleansing agents but their use should be restricted as much as possible. In lieu of them, substitute applications of oil, cold cream, or petrolatum.

Skin ailments may be acute, subacute or chronic. Some will respond to treatment while others will prove incurable. As a rule, skin troubles of puppies and young dogs have a tendency to be acute and respond to proper treatment. On the contrary, the tendency is toward the chronic state in old dogs. These extremes are undoubtedly due to the very active regeneration of the cells in the young, while in the old it is one of slow regenera-

tion coupled with the added burden of senility. This latter point should always be kept in mind when giving a prognosis.

The symptomology of skin diseases may be readily divided into two divisions—subjective and objective.

The subjective symptoms offer us little to go by, as an animal may lick, bite, gnaw or scratch a part that itches, burns, smarts, pains or is irritated.

The objective symptoms are the lesions that are present and are essentially primary and secondary. The primary group includes the erythema, papule, vesicle, blister, pustule, wheal, etc. The secondary lesions are demonstrated as scales, scabs, fissures, ulcers and scars. These constitute the elementary lesions of skin diseases, several of which may be present as a result of the same process. Taken together they constitute an eruption.

Dermatitis may be dry, moist, scaly, erythematous, vesicular, papular, or pustular.

This inflammatory process, beyond all doubt, is the most important non-parasitic skin disease which the veterinarian is called upon to treat. It has so many modifications and there are so many forms of eruption that it becomes, at times, one of the most difficult to recognize among all of the dermatoses. According to Van Harligen, dermatitis, which he refers to as "eczema," is an inflammatory, acute or chronic disease of the skin characterized at its commencement by erythema, papules, vesicles or pustules, or a combination of these lesions, accompanied by more or less infiltration and itching, terminating either in discharge, with the formation of crusts, or in desquamation." There are two symptoms which have a great tendency to manifest themselves in all cases of dermatitis and they are exudation and the formation of scales. A subjective symptom most commonly noticed in dogs is the perpetual scratching caused by the pruritus that is usually present.

It has been aptly stated that the treatment of dermatitis chiefly consists in its proper management. This, in brief, means correction of the general conditions which either cause or have the effect of prolonging an attack. There are three conditions which must be attended to in nearly every case of dermatitis, as either one, all or a combination are usually existent. These are dyspepsia, constipation and occlusion of the anal glands. The latter two are relatively easy to determine but the former may prove a difficult problem.

In the chronic stage of dermatitis, either an atrophy or hypertrophy of the tissues of the affected parts may occur. The involved area will appear as a very thin, scaly membrane, or the inflammatory reaction may lead to a marked thickening of the parts which form folds due to the excess formation of connective tissue.

Probably the commonest mistake in treating dermatitis is the use of irritating applications on conditions that really require bland ones. This is particularly true of subacute inflammations. Petrolatum and cold cream should be used freely and more extensively during this stage.

Acute inflammatory conditions are best treated with wet dressings. To relieve heat and pruritus a very satisfactory dressing is composed of aluminum subacetate solution (8 per cent), one part; saturated boric acid solution, 15 parts; and distilled water, 16 parts. Another serviceable mixture is composed of olive oil, five ounces; and calcium hydroxid solution, *q. s.*, to make one pint. Also, a saturated solution of magnesium sulfate is of value. Quoting an eminent dermatologist who has been coöperating with the Chicago Retail Druggists Association, in encouraging the use of U. S. P. and N. F. preparations, he states "Wet dressings prove more useful than ointments in very acute conditions."

For moist skin surfaces, dusting powders, lotions and ointments have been used extensively. However, ointments do not convey the remedial agent to the affected part as well as lotions and powders.

A very important matter in treating non-parasitic inflammations of the skin is that more depends on the method of applying the medicament than on the drug chosen for use. Also, too scanty applicaton of the agent used impedes recovery. This point should be borne in mind in dealing with ambulatory cases.

In chronic conditions, surgical interference sometimes proves of value in removing atrophic or hypertrophic tissue if the area involved is not too great. If extensive involvement is present, ointments or oily suspensions are in order. Boric acid, zinc oxid and butesin picrate ointments are very soothing. Ointments containing tar, resorcin, sulphur, cade, etc., are stimulating and healing and are usually chosen in cases of relatively long standing,

In pustular dermatitis bacterins containing *Staphylococcus albus* are strongly recommended. Likewise, iron cacodylate and sterile milk should not be forgotten in our attempt to stimulate the

resistance of the patient. For surface application there are many effective antiseptics that may be used.

Naturally, a correct diet and clean quarters go hand-in-hand with proper treatment of the skin.

Pruritus is primarily a symptom of several disturbances, which may be of internal or external origin. It is essential, therefore, that to get results one must search for the etiologic factor giving rise to the disturbance. Pruritus is often observed in parasitism, diabetes and pregnancy. In cases showing evidence of hemorrhoids, abscess and fistula of the anal pouches, rectal fissures, and catarrh of the anus and vagina, it is quite common to note a pruritus ani or vulvae. Further, it is not to be expected that the dog is the exception to idiosyncrasies and accordingly from time to time an animal may show a marked pruritus subsequent to the administration of certain drugs. The barbituric acid derivatives are the usual offenders. The use of strongly alkaline soap for bathing purposes also is a common cause. As a palliative treatment for the latter condition, subject the patient to a vinegar bath 1 to 250.

Urticaria is a very definite cytosis. Usually it is associated with irritation of the gastro-intestinal, urinary and pulmonary mucous membranes. Emotional and menstrual irregularities may be observed in some cases. Whether the dysfunction of the skin is a neuropathic or metabolic derangement remains to be settled. At any rate, urticaria, like pruritus, should be considered as a symptom and not as a disease.

When treating urticaria it is advisable to use epinephrin in connection with whatever treatment has been found advisable. It is of decided benefit in reducing the usual multiple swellings that are present.

In closing these few remarks, I want to leave one thought with you and that is: Failure to go deeper than skin deep in examining and treating a cutaneous disorder is an injustice to yourself, your client and your patient.

Discussion

Dr. K. U. Jones: When a dog scratches all of the time and seems to have a general irritation, a dryness of the skin that is sometimes called chafing, and you give him a bath and oil him and dose him well for a while, do you have much luck with calcium in such cases?

Dr. Khuen: Only a fair degree. In fact, it isn't worth while. There are some cases that are very stubborn and that will never yield to treatment; I don't know why. However, there are some that will yield very nicely.

Dr. Jones: Suppose you have a case where there is a thickening of the skin that usually comes in summer, an eczema on the back near the tail.

Suppose you clear up the condition and it is all right for a while. Then the owner brings the dog back for the same condition. Do you consider that dietary?

DR. KHUEN: In 99 cases out of 100 you will find an occlusion of the anal glands and if you do nothing but clean out the glands, you will bring about recovery.

The animal will swing around and try to bite its tail; it will sometimes bite the toenails or go up the leg. If you examine the anal glands, you will usually find there is plenty in them. I have had that experience time and time again.

I had one case, a dog that had been taken to five veterinarians. Fortunately, I had happened to talk to a young doctor. Like many veterinarians, I was going along, using the text-book and old-school methods. The dog had three or four fistulae on one side and the owner was very much dissatisfied because the dog's condition had not improved in spite of treatment.

In the course of the conversation with this young doctor, we were talking about cervicitis in women and I asked him about the treatment. He told me about a very, very simple treatment. I applied it to the anal canal in this case and with very good results. I am satisfied it is better than any text-book treatment. It has proved one hundred per cent efficacious in my experience and I can safely and honestly say that where there is a case of fistula of the anal canal, there will not be a return of the condition.

Evacuate the fistulous canal by pressure. If there is a fistula that has sealed, open it either by probing or with a knife; then go in and clean it out with boric acid solution on swabs. Apply alcohol. Allow time for evaporation and then follow with a dry swab. After such a cleaning, burn out the tract and gland with twenty per cent silver nitrate solution—and don't be afraid of it.

You will find with one good treatment the dog takes care of itself and in eighty per cent of the cases you can let the dog go home immediately. In five to seven days it will be completely healed.

I have had cases where the opening was as large as a ten-cent piece and complete healing was brought about in six days, after the condition had existed for twelve or fourteen months. I had one case, where the dog had fistulae, that had been treated for three years. The area involved was the size of a golf ball. I cleaned it out and treated it in the manner described and there was no recurrence on that side. Later the opposite side became affected in the same way. The owner brought the dog to me and told me to treat it as I had before.

DR. JONES: Do you have much trouble in cases of chronic skin troubles that appear in the summer and pass away in the winter, where there is a sort of scar tissue, and there is constant irritation although the anal canal is perfectly clean? They are chronic cases that occur every summer and yet the anal glands are clean.

DR. KHUEN: I can't say I do. I have not had very many cases of that kind.

DR. JONES: I usually follow the method you use. But my trouble is with these skin troubles that are chronic. Acute cases are cleared up quickly but I am talking about the chronic cases. I wondered if you had any trouble with that kind and if you thought the trouble was dietary.

Calcium has been recommended for systemic treatment. I have also used calcium with thyroid and parathyroid. I don't see much difference.

DR. KHUEN: This anal gland involvement is one that really warrants investigation every time a skin case comes to you, and in a high percentage of cases you will get most startling results, because the animal will stop scratching within three to five days.

DR. JONES: I am talking about recurrent cases, where the condition is entirely cleaned up and then comes back.

DR. KHUEN: Warn the owners that there is a possibility of recurrence, that the condition may come back: Be honest with them and with yourself in cases like that.

DR. T. H. FERGUSON: I would like to ask the Doctor to touch on the subject of internal parasites and their relation to skin irritation. Is any particular worm involved?

DR. KHUEN: I have never made any observations on that but the round worm is the one that is most commonly found and to which we can attribute most of such trouble.

DR. FERGUSON: We have had a few cases now and then which were highly infested with tapeworms and they manifested rather severe skin irritation. Of course, their mutilation of the skin would produce a condition similar to the anal gland manifestations, biting and so forth. Such cases would clear up remarkably quickly after thorough tapeworm treatment. I don't know whether there was any connection but we have had several such cases. Possibly it was just a coincidence. Perhaps there is some toxin in connection with the parasite in a heavily infested case.

DR. KHUEN: I recall a case not so long ago that would compare with what you have in mind. It was not a case of parasitism, but it happened that the owner had been painting the back porch and as fast as he painted, the rascal dog would come along and lick off the paint.

DR. FERGUSON: Did he show poisoning, too?

DR. KHUEN: Not much; just a local skin eruption.

DR. E. J. FRICK: I would like to emphasize what Dr. Ferguson has said. I thought I knew what caused moist eczema in dogs. Years ago I blamed most of it on diet, to lack of protein feed.

In the last few years, particularly in the last few months, we have had cases of fox terriors that had moist eczema. In our experience we have found that if you get rid of the tapeworms in cases of moist eczema, you have solved the cause.

I would like to ask how or why heavy worm infestation causes moist eczema in the skin of the dog. I am quite sure it is one cause.

I wanted to emphasize what Dr. Ferguson says. Do nothing but worm the dogs, and moist eczema will clear up if it is due to that cause.

DR. KHUEN: You are dealing with a lower percentage, because the majority of the cases of moist eczema will not have tapeworm infestation. In so far as the skin irritation is concerned, I am sure you will find it to be secondary, as a result of the movement of the worm within the bowel. The animal wants to bite, snap and chew and cannot get hold of the irritant. In the so-called dermatitis of the moist type, one observes a merely mechanical thing. It is just indirectly involved because, as you said, when the worms are removed, the dermatitis disappears. You remove the irritation and, therefore, relieve the patient.

DR. H. V. CARDONA: I do not believe the paper attached sufficient importtance to the matter of urinalysis. We find certain conditions in Texas are due principally to improper elimination, causing renal disturbances. We find the condition principally in dogs that are brought from the North—Chows and Pekingese.

It is practically an internal scratching proposition, and sometimes there will be a case where the dog scratches from the time he comes in until he leaves. I have tried every treatment that I thought was feasible, including microscopic examination of the feces, examination of the ears, the teeth, the throat, the anal glands, improving elimination, giving the so-called alteratives, and so forth. Yet, I have practically failed with many of these Pekingese and Chows.

I have a Pekingese under treatment now. The owner paid $1,000 for it in England. The dog has been sctatching for over two years and is still scratching.

DR. KHUEN: Perhaps that is a condition that falls under disturbances of the sympathetic nervous system. Whether it is or isn't in that particular case, of course, I cannot say. You are better fitted to decide that than I. It would seem that it might be a neurotrophic disturbance that will never be overcome.

DR. C. F. SCHLOTTHAUER: Dr. Reihart has done some work on blood chemistry of dogs affected with worms. I wonder if he will discuss the possibility of worm infestation causing lower calcium resistance and lower blood calcium and the possibility of correcting it with calcium.

DR. O. F. REIHART: The condition can be corrected by increasing the calcium. In cases of dogs heavily infested with worms, I would suggest building up the calcium metabolism.

DR. J. C. WRIGHT: I am of the opinion that Doctor Cardona is right, in a way. We should not think any one specific cause brings about the condition in dogs. I believe there are a number of causes.

Coccidiosis is prevalent in the South. We get many cases of coccidia infestation, tapeworm infestation, anal gland troubles, and then we will get cases that cannot be relieved by the treatment for any of those specific conditions just named. I have in mind two or three cases we have had in the last three or four months, one a white Collie, nine years old. To my knowledge the dog has been scratching for three years. I have used everything I could think of and finally I became disgusted and thought I would either kill her or cure her. I gave her ten grains of arsenic every day for three days. She peeled off, got well and quit scratching.

I have never found a veterinarian who can satisfactorily explain what the arsenic does in such large doses. The physiological dose would be a quarter of a grain, but I had such good results from this larger dose that I used it on two bird dogs that had been scratching for a long time. It almost killed them but they quit scratching.

Don't overlook coccidiosis. We get a great many cases of it in the South. A dog's coat will get rough and "starey" and he will scratch.

Tapeworms may cause the condition, the worm throwing off toxin causing the irritation rather than it being a mechanical irritation. I believe it is the toxin absorbed from the worm.

CHAIRMAN PARKER: There is one thing no one has mentioned that we do quite frequently, and that is clipping. It is rather hard to get the owners of Chows and Pekingese to consent to it, but that is one of the first things we do if the owner will allow us. I should think that would be a particularly good thing in the South. We know the Pekingese and Chows are born in a cold country and clipping relieves them. We usually clip them twice a season.

DR. CARDONA: These dogs I have been talking about have been clipped and reclipped. I have treated skin disturbances in the tropics and I have treated them in the North, around Chicago and South Dakota, but I have never come in contact with such stubborn conditions of skin disturbances or dermatoses, parasitic or non-parasitic, as I have in Texas.

MEMBER: In a case where a dog will slide the hind part over the floor and drag himself, is that due to the obstruction in the anal glands?

DR. KHUEN: In a great many cases it is.

DR. BRYSON: After you have cleaned the anal gland, how long is it before that condition will stop?

DR. KHUEN: About five days, on the average.

California Veterinary Conference

The annual conference arranged by the University of California in coöperation with the California State Veterinary Medical Association will be held at Davis, January 4-7, 1932. The program will include lectures and demonstrations by a number of members of the faculty of the University of California, officials of the State Division of Animal Industry and veterinary practitioners.

Dr. E. B. Dibbell, of Baltimore, Md., will be the special lecturer at the 1932 conference. A preliminary meeting with Dr. Dibbell will be held in Los Angeles, on January 2, under the auspices of the Southern California Veterinary Medical Association and the Los Angeles Veterinary Hospital Association.

FOOT-AND-MOUTH DISEASE AND VESICULAR STOMATITIS*

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Vesicular stomatitis has been discussed several times at veterinary meetings in this country. The interest in this not very important disease was aroused mostly during or after a conspicuous outbreak. Even then the attention paid to it was a more indirect one, being more or less restricted to the question of its differentiation from another disease which engaged the public interest in this country much more than in any other country of the world. I mean foot-and-mouth disease. No wonder that in this country vesicular stomatitis is almost always mentioned in connection with foot-and-mouth disease. Several years have passed since vesicular stomatitis make its appearance in a local outbreak. Nevertheless, it seems to me that even in time of quiescence vesicular stomatitis may be discussed, inasmuch as research work is constantly carried on and sometimes makes progress regardless of the presence and economic importance of a disease. It is the purpose of this paper to outline the present state of our knowledge on foot-and-mouth disease compared with vesicular stomatitis, stressing particularly the differences and the possibility of differentiation between the two diseases.

The past ten years have brought us remarkable new knowledge on the etiology of foot-and-mouth disease, as well as of vesicular stomatitis, which became of practical and economic importance in the diagnosis and also the control of the disease. While in foot-and-mouth disease the filtrability of the contagium has been known since 1898, a fact which established our knowledge of filtrable viruses, first Cotton,[1] in 1925,and a short time later, Olitsky, Traum and Schoening[2] also showed the filtrability of the vesicular stomatitis virus. The significance of these findings lies in the fact that they indicate the clinical similarity or identity of the diseases corresponds also in regard to the etiology. Furthermore, for vesicular stomatitis this fact marks the beginning of accurate investigations on experimental bases.

At about the same time, in the case of foot-and-mouth disease, it was found first in France (Vallée and Carré[3]) and then in

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Germany (Waldmann and Trautwein,[4] Trautwein[5]) that the filtrable virus of foot-and-mouth disease is not a uniform organism, but that there exist several types or strains of the same virus which may be distinguished from one another by the fact that the immunity produced by one strain does not protect against an infection with a second or third strain of virus and vice versa. Up to the present time, there have been found at least three standard strains or types of foot-and-mouth disease virus from all over the world. Besides the three standard strains, which are called A, O and C, after an international agreement, there exist quite a number of so-called atypical strains, which show a little variation in their immunologic characters. These findings mean practically that today an animal can be infected at least three times, at relatively short intervals, with foot-and-mouth disease.

Two Strains of Vesicular Stomatitis Virus

As in foot-and-mouth disease, the same conditions have been found by Cotton[6] in vesicular stomatitis also. But thus far, strains of vesicular stomatitis virus have proved to be less abundant than those of foot-and-mouth disease. At this time there are known two different strains or types of vesicular stomatitis virus which are named after the American states where they were first found in local outbreaks: strain "Indiana" and strain "New Jersey" (Cotton[7]). Further investigations of future outbreaks will have to prove whether there are still more strains or types of vesicular stomatitis. This can be demonstrated experimentally quite easily in large or small animals by trying to inoculate them after their recovery from one or more infections with another virus of undetermined type. Crossing the immunity of one or more strains indicates the presence of another virus strain.

The finding of different virus strains in foot-and-mouth disease and also in vesicular stomatitis has made the differentiation between the two diseases more difficult than before. The U. S. Bureau of Animal Industry, at Washington, D. C., always keeps in stock some small and large animals which have passed through an infection with the strains of vesicular stomatitis virus thus far known. In suggestive cases, these animals are inoculated with the virus originating from animals with an infection suspicious of foot-and-mouth disease or vesicular stomatitis. Owing to the plurality of the viruses of foot-and-mouth disease and vesicular

stomatitis, it is not possible to determine the presence of foot-and-mouth disease in cases where the immunity of the vesicular stomatitis animals is cancelled, because the possibility of a new, thus far unknown, virus strain of vesicular stomatitis has to be taken into consideration.

Thus far, vesicular stomatitis corresponds, in regard to filtrability and plurality, to the foot-and-mouth disease virus. Furthermore, foot-and-mouth disease research has resulted in other progress which has extended our knowledge on the general biology of the filtrable virus and may be of some importance in the further investigation or differentiation of vesicular stomatitis.

Filtration Experiments With Foot-and-Mouth Disease Virus

In the investigation on the filtrability of foot-and-mouth disease virus, the use of very small and close filters, so-called "ultrafilters," has been introduced. The size of pores in these "ultrafilters" is about 100 to 300 times as small as in the usual filter candles (Berkefeld, Chamberland a, s and o) as generally used for microbiological filtration purposes. By filtering the different strains of foot-and-mouth disease virus through these "ultrafilters" it has been found by Modrow[8] that the individual strains show a different behavior with regard to the different sizes of pores, which pertains also to their own size. While the strains A and C proved to be about equal in size, the strain O is much smaller, which is demonstrated by the fact that it still passes through smaller-pored filters than the others do.

Such ultrafiltrations have not yet been carried out with the virus of vesicular stomatitis. They are indicated from a purely scientific standpoint in order to decide whether or not this virus also corresponds in this regard with the foot-and-mouth disease virus.

In foot-and-mouth disease research a further remarkable progress has been made which became fundamental for the biology of all filtrable viruses. It is the successful cultivation of the foot-and-mouth disease virus in tissue cultures, which was first done by Hecke[9] in Germany. By this achievement the investigations of numerous authors of all nationalities, carried out before and since the filtrability of the foot-and-mouth disease virus first was established, but which were accompanied by failures or disappointments in most cases, now entered a new stage. A kind of a dream in the investigation of foot-and-mouth

disease thus has been realized. The new progress demonstrates clearly that the foot-and-mouth disease virus is a very small organism, which can be multiplied and kept alive outside the animal body for numerous generations, but, unlike the bacteria, only in very close contact with living tissue. The best medium for its growth proved to be the skin or internal organs of guinea pig embryos. For completing our knowledge on vesicular stomatitis virus also, these cultivation experiments will have to be tried.

No Generalization of Infection in Vesicular Stomatitis

The clinical and pathological picture of vesicular stomatitis is better known in this country than in any other country in the world. Therefore, it is not necessary for me to go into this subject. Summarizing our present knowledge, I will merely mention that generally vesicular stomatitis develops the same picture as foot-and-mouth disease, so that in individual cases even a well-trained specialist is not always able to distinguish the two diseases. But, comparing the whole complex of vesicular stomatitis with foot-and-mouth disease, certain differences become apparent, characterizing vesicular stomatitis as a kind of mild foot-and-mouth disease. This is shown first by the fact that in vesicular stomatitis, under usual conditions, no generalization of the infection takes place. That means the malady is mostly restricted to the most susceptible tissue or the place of first localization—the mucous membrane of the mouth. In the case of foot-and-mouth disease this happens only occasionally, while usually the infection becomes generalized. The vesicles make their appearance, aside from the mucous membrane of the mouth, also on the claws.

A further significant difference between vesicular stomatitis and foot-and-mouth disease is the usually lower virulence of vesicular stomatitis compared with foot-and-mouth disease. This is demonstrated on the one hand by the fact that vesicular stomatitis very often shows only a slight tendency to spread, and on the other hand that fatal cases of vesicular stomatitis are practically unknown, even in young animals. While in foot-and-mouth disease, very often so-called "malignant cases" are observed which occur, in the first place, in young animals, calves or pigs, and not uncommonly in a large number. In these cases significant lesions in the heart muscle are to be seen, known as "myocarditis acuta multiplex" or commonly called

"tiger heart." As a rule they are the cause of death in foot-and-mouth disease. These lesions have not been observed thus far in vesicular stomatitis. Therefore, it is advisable to look for them, as they may give important help in diagnosis.

In foot-and-mouth disease the entire course of infection, in its various stages, has been investigated thoroughly. We know accurately in what parts of the body and how long the virus is to be found, and also where and when it leaves the body. In vesicular stomatitis our knowledge is not so extensive in regard to experimentally proven details. In my more recent investigations[10] I could confirm the clinical experience that vesicular stomatitis, in most cases, seems to be contagious in the earlier stages of the disease, by the very interesting finding that the virus shows its greatest concentration and highest virulence in the very beginning of the infection when, macroscopically, no vesicles are yet visible. The clinical experiences under field conditions, and also those of experimental inoculations, indicate that after breaking of the vesicles the virus either very quickly disappears or it loses its virulence. These facts require that virus used for diagnostic purposes should be collected only from unbroken vesicles, otherwise one takes a chance of unsuccessful inoculations, such as are reported very often in the literature.

Vesicular Stomatitis Virus Survives 14 Days in Guinea Pigs

Contrary to the experience with large animals, I found[20] in guinea pigs that the vesicular stomatitis virus may survive up to 14 days in the lesions produced in these animals. It seems not impossible that it might persist even longer. Further investigations will have to decide this.

A very important question in the epizoölogy and also in the control of the disease, about which mainly hypothetical or theoretical views have thus far prevailed, has been cleared up recently in Germany. During the time that foot-and-mouth disease has been controlled in Germany by severe veterinary police and quarantine regulations, cases have occurred repeatedly, in which the disease has been spread, after lifting the quarantine, by shipping animals which had been sick, but which were fully recovered when they left the herd. Or, in other cases, it happened that animals which had been brought into a recently infected herd, which had been under quarantine, came down shortly after their arrival without any possibility of finding the source of the infection. In these, or similar cases, "carriers" or "spreaders"

of the virus were suspected, but they could not be proven. It was suggested that the virus might stay for a longer period within the horny sole of recovered animals and it was supposed to leave the body when the horn grew down to the surface of the sole. This theory, which had been advanced especially by Swiss authors (Hess[11], Zschokke[12]) could not be sustained by experimental examinations since it was not possible to find the virus in spite of numerous inoculations of small and large animals (Brandt[13]). After starting new investigations in Germany, during the last few years, with chemical-physical methods, it has been possible to demonstrate foot-and-mouth disease virus even in very small, otherwise not demonstrable amounts by precipitation, or absorbing it with large amounts of protein fluid. Thus, the virus could be concentrated to such a degree that it could be demonstrated by means of animal experiments. Using this method systematically in examinations of blood and secretions of a large number of recovered animals, it was found that of 500 oxen, 8 (about 2 per cent) carried the virus, in the blood or other organs, for a variable period after recovering from the infection. In the longest instance the virus could still be found 246 days after inoculation in the blood, and also leaving the body with the urine. This evidently proved that there exist real carriers of foot-and-mouth disease. These findings of Waldmann, Trautwein and Pyl[14] throw new high lights on the epizoölogy and control of foot-and-mouth disease. It seems to me that these findings are of great importance for the method of foot-and-mouth disease control in this country. In Germany, owing to the very frequent outbreaks of the disease, we are not able to use the radical "stamping out" method recommended in this country, without running the hazard of having to kill the greater part of our live stock. But, in this country, where, compared with European conditions, foot-and-mouth disease occurs only occasionally, in relatively local outbreaks, this recent discovery of carriers gives the most objective and convincing reason for the necessity of killing off all infected herds, because their survival, even after recovery, is a potential danger to the live stock of the entire nation.

Differential Diagnosis

For the differentiation of foot-and-mouth disease from vesicular stomatitis, under practical conditions, the susceptibility of the horse for vesicular stomatitis, and its non-susceptibility for

foot-and-mouth disease on the other hand, is of decisive importance. Thus far it is the only practical possibility for the differentiation of the two diseases. It signifies such a remarkable difference in the pathogenicity of the two viruses that further deviations in the pathogenicity might be supposed. Since in vesicular stomatitis the transmission of the virus from horses and cattle has been successful only in hogs, rabbits and guinea pigs thus far, I have examined the pathogenicity of vesicular stomatitis, in my investigations in the Bureau of Animal Industry, at Washington, D. C., for all available experiment animals. The details of these investigations, which I report here shortly, are given in a special publication.[15]

In confirmation of former investigations by Mohler,[16] Cotton,[1] and Olitsky, Traum and Schoening[2], the hog was found to be susceptible to artificial inoculation. Using quite young pigs, I found that these animals are also susceptible to contact infection. They may also die from artificial or natural infection which had thus far not been observed in vesicular stomatitis. In such dead pigs the virus could be found, aside from the local lesions, also in the heart muscle, without producing visible lesions, as is mostly the case in foot-and-mouth disease.

Sheep and Goats Susceptible to Vesicular Stomatitis

Beside the hog, I found sheep and goats also susceptible to artificial inoculation with vesicular stomatitis virus. These animals yielded lesions only at the site of inoculation. Generalization was not observed. In contrast to the findings of Olitzky,[17] who reported the rabbit to be susceptible, not only in the mouth, but also on the cornea, in my investigations this animal proved to be only very slightly susceptible.

For the first time I succeeded in transferring the vesicular stomatitis virus to white and wild rats. Both virus strains could be transferred to white rats through numerous generations so that this animal proved to be a proper and cheap test animal. In contrast to the guinea pig, the white rat never develops generalized lesions. Noteworthy is the fact that the wild rat also proved to be susceptible. This animal could be artificially inoculated, or got the infection by exposure, after the pads had been scarified. Therefore, the wild rat which plays an important part in the transmission of so many infectious diseases, ought to be considered also in the control of vesicular stomatitis. I may mention at this time that recently, in England, the wild rat has

been found susceptible to spontaneous foot-and-mouth disease infection, so that there can be no further doubt of the part played by rats in spreading foot-and-mouth disease.

My experiments with white mice were unsuccessful, as far as positive infections were concerned. These animals merely demonstrated that they may retain the virus, after artificial inoculation, in a virulent stage for several days, without yielding any visible lesions. Further investigations with this animal seem to be necessary.

In my investigations, the cat proved to be only slightly susceptible. It may be that better results could be obtained with kittens. For my experiments only older animals were available.

The transmission of vesicular stomatitis virus to poultry (chickens and pigeons) was successful.

Experiments with dogs, which proved to be susceptible to foot-and-mouth disease (Hoeve[18]), have not yet been carried out with vesicular stomatitis.

Horse May Not Be Only Animal Available for Differential Diagnosis

A comparison of the results of these experiments with similar ones in foot-and-mouth disease shows that they correspond as far as the absolute result is concerned. At any rate, there are differences in the degree of the infection, insofar as foot-and-mouth disease generally produces more severe and marked lesions than vesicular stomatitis. Summarizing the comparison of the pathogenicity of foot-and-mouth disease and vesicular stomatitis, it has yet to be established that the pathogenicity of vesicular stomatitis for the horse is practically the only difference available for distinguishing the two diseases.

When carrying out animal inoculations for diagnostic purposes, it should always be remembered that a large number of animals must be used for decisive experiments. The virulence of vesicular stomatitis virus is sometimes only slight and on the other hand the susceptibility of the test animals may be quite variable. As will be shown, most animals can be immunized actively quite easily without showing any symptoms of the disease. Therefore, only those animals should be used which never have had any contact with infected animals. Quite young animals seem to be the most suitable.

It is to be understood that experimental investigations with small animals have not been carried out in vesicular stomatitis

to the same extent as in foot-and-mouth disease as the first successful transmission of vesicular stomatitis to these animals is of a relatively recent date. As in foot-and-mouth disease, the guinea pig also proved to be a very proper and cheap test animal for vesicular stomatitis. Both viruses can be transferred in an unlimited number of passages without interruption and there is no doubt that the guinea-pig experiments have enhanced the research in both diseases in a very appreciable manner. No wonder that we know the diseases at least as well, if not better, in this small animal, than in the large ones. Thus far, the guinea-pig test has not proved to be a means of differentiation in regard to the clinical picture of foot-and-mouth disease and vesicular stomatitis, as had been hoped for. The very slight differences in the course of the infection as, for instance, the longer incubation period, or less frequent generalization of vesicular stomatitis, are not evident or regular enough to be utilized in individual cases. Nevertheless, there exist some differences in the behavior of the guinea pig toward the two viruses as were shown in experiments recently carried out at Washington, D. C. The differences are based on the immunization conditions in foot-and-mouth disease, which I investigated in the same manner several years ago.[19]

Immunity Follows Exhibition of Visible Lesions of Foot-and-Mouth Disease

As a rule, the guinea pig cannot be actively immunized by any treatment with living foot-and-mouth disease virus without showing visible lesions. In foot-and-mouth disease, there are two possibilities as to the reaction of the guinea-pig body against a virus administration. The guinea pig develops visible lesions after a virus administration and then it proves to be immune, or the virus administration fails to produce open lesions and then the animal does not become immune, as shown by the result of a reinoculation.

Similar experiments in vesicular stomatitis show some differences. First I found that the guinea pig can be successfully inoculated only by scarification on the metatarsal pads. All other virus administrations are not capable of producing an open infection, with the exceptions of a very few isolated cases. But, in contrast to foot-and-mouth disease, the unsuccessfully treated guinea pigs prove to be completely immune when reinoculated by scarification in the usual way.[20]

I try to explain these striking results by differences in the virulence of the two viruses. Foot-and-mouth disease virus is

apparently much stronger than vesicular stomatitis virus. This is shown by the fact that the foot-and-mouth disease virus, administered into nonsusceptible tissues, breaks down or overcomes the natural resistance of these tissues and results in an open infection. If, in foot-and-mouth disease, there occasionally results no visible infection after such virus administration, the immunity so produced is not strong enough to protect against a later reinoculation into susceptible tissue. The stronger virulence of the foot-and-mouth disease virus breaks down the immunity thus produced. On the other hand, the relatively lower virulence of vesicular stomatitis virus infects only by an immediate inoculation (scarification) into susceptible tissue. If inoculated in any other way it does not prove to be strong enough to break down the natural resistance of a non-susceptible tissue. But, after such a treatment an active immunity is induced, which is so strong that it cannot be cancelled by the relatively low virulence of vesicular stomatitis virus, even when inoculated into susceptible tissue.

The experiments showing some difference between foot-and-mouth disease and vesicular stomatitis viruses in guinea pigs led me to an examination of the passive immunizing conditions.

Passive Immunization Experiments

Passive immunizing experiments in guinea pigs are very widely used in foot-and-mouth disease for testing foot-and-mouth disease immune serum. For this purpose guinea pigs in series are injected subcutaneously with various doses of the immune serum to be tested and at the same time they are inoculated on the metatarsal pad by scarification. After this treatment, all guinea pigs yield an open infection at the site of inoculation. Foot-and-mouth disease immune serum cannot prevent a local infection even in very large doses, but it is capable, when its potency is strong enough and in sufficient dosage, of preventing generalization of foot-and-mouth disease infection which otherwise regularly takes place. The smallest serum dose which just prevents generalized foot-and-mouth disease infection in a guinea pig is supposed to be the titre of the serum tested. This method, first proposed for foot-and-mouth disease serum by Waldmann and Pape,[21] has been found to be satisfactory also for similar conditions in vesicular stomatitis, by Olitzky, Traum and Schoening.[2]

After having established the possibility of active immunization against vesicular stomatitis of guinea pigs, I examined similar

conditions in passive immunization, but changed a little the technic of serum and virus administration.[22] I did not inoculate the guinea pigs simultaneously as in the case of foot-and-mouth disease and as carried out by Olitzky, Traum and Schoening[2] in vesicular stomatitis. I administered the serum at least 24 hours before the inoculation, which was made in the usual cutaneous way. For protective serum I always used homologous (guinea pig) convalescent serum. By this technic it was possible to protect guinea pigs completely, which means even against the local lesions at the site of inoculation. If the serum dose injected has been too small, the protection proves to be only temporary; the guinea pigs come down soon after inoculation. If the serum and virus are administered simultaneously, the protective action is unreliable, or fails altogether.

Immunization Against Vesicular Stomatitis Is Fairly Simple

These immunization experiments in guinea pigs, which have been tried also in white rats, and with the heterologous immune sera (from rabbits, horses, rats and cattle), show that immunization against vesicular stomatitis is fairly simple and that it evidently differs from that against foot-and-mouth disease. I explained the difference between foot-and-mouth disease and vesicular stomatitis viruses by the lower virulence of the latter as compared with the former. Whether this lower degree of virulence is constant in vesicular stomatitis, or whether it is a property of only the two virus strains (Indiana and New Jersey) used in my experiments, cannot be decided definitely, as these two strains have been transmitted through many hundred guinea-pig passages during the last five or six years. Corresponding experiences with foot-and-mouth disease show that this virus does not become attenuated by guinea-pig passages. At any rate the results of my investigations will have to be checked with fresh vesicular stomatitis virus originating from a more recent outbreak. If my findings are confirmed, the passive immunity test in guinea pigs would, in addition to the horse test, give us another means of differentiating between vesicular stomatitis and foot-and-mouth disease.

After all, there remains a very close biological relationship between foot-and-mouth disease and vesicular stomatitis virus, which gives us the right to regard the two diseases as representatives of one and the same group. The outstanding characteristic

apparently much stronger than vesicular stomatitis virus. This is shown by the fact that the foot-and-mouth disease virus, administered into nonsusceptible tissues, breaks down or overcomes the natural resistance of these tissues and results in an open infection. If, in foot-and-mouth disease, there occasionally results no visible infection after such virus administration, the immunity so produced is not strong enough to protect against a later reinoculation into susceptible tissue. The stronger virulence of the foot-and-mouth disease virus breaks down the immunity thus produced. On the other hand, the relatively lower virulence of vesicular stomatitis virus infects only by an immediate inoculation (scarification) into susceptible tissue. If inoculated in any other way it does not prove to be strong enough to break down the natural resistance of a non-susceptible tissue. But, after such a treatment an active immunity is induced, which is so strong that it cannot be cancelled by the relatively low virulence of vesicular stomatitis virus, even when inoculated into susceptible tissue.

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After all, there remains a very close biological relationship between foot-and-mouth disease and vesicular stomatitis virus, which gives us the right to regard the two diseases as representatives of one and the same group. The outstanding characteristic

of the two diseases is the epitheliotrophy or epidermotrophy of their viruses. The vesicular stomatitis virus, as compared with that of foot-and-mouth disease, has a lower virulence, which is shown by the lesser tendency to produce generalized infections, by its easy immunizing properties and by its usually slight tendency to spread by contact infection. Whether this lower virulence has any relation to its particular pathogenicity for horses has not thus far been cleared up experimentally.

As in many similar instances observed in biology, the one shown by foot-and-mouth disease and vesicular stomatitis demonstrates that aside from the very pathogenic foot-and-mouth disease virus there has come about, through unknown genetic influences, another variety or specific entity represented by a less virulent form than the original one. Such variations are not particularly rare in microbiology. I have only to mention the group of typhoid and paratyphoid organisms, which evidently demonstrate similar relations. Among the filtrable viruses also we find similar conditions. I mention, for instance, the two viruses of smallpox and alastrim, which also belong to the group of epitheliotropic viruses. Here the smallpox virus represents the more virulent form with a tendency to severe generalized infection, while alastrim is the less virulent one and is less apt to be transmitted by contact. In both groups of diseases, however, foot-and-mouth disease and vesicular stomatitis on the one hand, and smallpox and alastrim on the other, we see that occasionally, under conditions not yet known, the variety of apparently less virulence may produce a very extensive outbreak. That should cause us not to neglect these diseases in our scientific interest.

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Broadcasting Program

Under the auspices of the Committee on Broadcasting of the New York State Veterinary Medical Society, the following talks were given during the past three months over Station WGY:

October 7—"Mastitis," Dr. D. H. Udall, New York State Veterinary College, Ithaca.
October 14—"Better Protection for the Stock-Owner Through the Dog-Tax Law," Dr. O. E. McKim, President, Veterinary Medical Association of New York City, Port Chester.
October 21—"Emergencies on the Farm," Dr. F. F. Fehr, Secretary, Western New York Veterinary Medical Society, Buffalo.
October 28—"Safe Milk is Essential to Rural as Well as City Consumers," Dr. J. F. Miller, State Department of Health, Albany.
November 4—"Blackhead of Turkeys and Chickens," Dr. E. L. Brunett, New York State Veterinary College. Ithaca.
November 11—"The Control of Bang Abortion Disease in Cattle," Dr. H. L. Gilman, New York State Veterinary College, Ithaca.
November 18—"A New Idea Regarding Milk Fever," Dr. C. E. Hayden, New York State Veterinary College, Ithaca.
November 25—"The Milking Machine," Dr. W. C. Snyder, Dairymen's League Coöperative Association, Watertown.
December 2—"Pasteurization for Safety of Milk Consumer, "Dr. John H. Darrow, former President, Hudson Valley Veterinary Medical Society, Poughkeepsie.
December 9—"The Relation of Clean Cows to Clean Milk," Dr. J. H. Hewitt, Borden's Farm Products Co., New Berlin.
December 16—"Practical Veterinary Help on the Farm," Dr. R. W. Gannett, former President, New York State Veterinary Medical Society, Brooklyn.
December 23—"Breeding and Caring for Horses," Dr. J. F. DeVine, former President, New York State Veterinary Medical Society, Goshen.
December 30—"Feeding the Cow Fresh Air," Dr. F. L. Fairbanks, Department of Agricultural Engineering, New York State College of Agriculture, Ithaca.

The following schedule has been announced for January:

January 6—"Indigestion of Cattle," Dr. M. C. Thompson, former President, Hudson Valley Veterinary Medical Society, Sharon, Conn.
January 13—"The Effect of Freezing Milk and Ways of Prevention," Dr. J. F. Jansen, Sheffield Farms, Inc., Oneonta.
January 20—"The Importance of Meat Inspection," Dr. B. J. Cady, Inspector, U. S. Bureau of Animal Industry, Albany.
January 27—"Watering Farm Live Stock," Dr. L. E. Moore, Amsterdam.

The talks are given at 12:35 E.S.T., each Wednesday.

DEFICIENCY PROBLEMS IN CATTLE*

By A. F. SCHALK, *Columbus, Ohio*

College of Veterinary Medicine, Ohio State University

The so-called newer nutrition can hardly any longer be considered as a possible fancy or myth. Sufficient experimental data of a positive and determining nature are now available to dispel the pessimistic inclinations of the most fastidious. Within less than two decades it has asserted itself with a definiteness that commands hearty recognition among the sciences.

During this brief period of time a number of classical researches have been projected, pursued and completed in connection with the newer nutrition and nutritional deficiencies, with conclusions that are fundamental in nature and of far-reaching significance as regards both the human family and many members of the animal kingdom when under the confines and restrictions of domestication.

So strongly has it implanted itself in the minds of present-day investigators that, when considering experimental procedure in animal diseases, nutritional deficiency possibilities are quite frequently given a prominent place in the project outline. Time was, not far back in the recent past, when nutritional deficiency was given practically no consideration whatsoever, in the field of experimentation. Those may be appropriately termed the "Halcyon Days" of the infection or germ theory of disease.

The disease pendulum has perhaps already swung too far afield in the germ theory zone. However, the present-day nutritional deficiency innovations are serving admirably well to coördinate and equalize conditions so that the pendulum's oscillations are confined to a more restricted range in one direction and directed more to the opposite side of the balance. In this way, a rather happy medium is being established, with the germ theory at one extreme and the nutritional causes at the other, with the remaining causes of disease falling in somewhere intermediate between these two majors.

When considering the term "disease" we are often inclined to be too literal in our interpretations. Practically speaking, disease may be defined as any deviation from the normal physiological status which incurs derangements that materially disturb the

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health and well-being equilibrium of an animal. It is not to be inferred that such derangements and disturbances necessarily mean acute sickness of a febrile nature. While it is true that the latter interpretation represents the average person's conception of disease, a more liberal and comprehensive idea of the term includes practically everything that may interfere with, disturb or inhibit good strong vigorous development of the young; efficient, economic production and normal physiologic reproduction in adult animals.

Success or failure in animal husbandry is almost absolutely determined by the manner in which these three phases of the life cycle of animals are carried out. If they are successfully and properly fulfilled, the industry is profitable and all is well. However, if they are attended by grave disturbances and diseased conditions, great economic losses are sustained and failure results.

Importance of Nutritional Deficiencies Not Appreciated

With the possible exceptions of infection and parasitism, there is perhaps no single cause or group of causes that are more potent in bringing about health disturbances than those occasioned by the so-called nutritional deficiencies. Of course,this is not fully recognized by the laity, nor by a sufficient number of scientific workers at the present time. Nevertheless, sufficient data and evidences are now at hand that indicate quite clearly that the future holds in stock some very fruitful possibilities in this field that will go far to explain, at least partially, many of our present-day mysteries in the domain of animal disease.

Nutritional deficiency simply means an insufficient quantity or low-grade quality of vitamins or minerals, or both, in the materials that compose food rations. Recent studies have shown that, in some instances, these two vital materials are more or less dependent upon each other for maximum nutritive results. This is particularly true with some minerals, wherein a sufficient amount of the proper kind of vitamins is necessary to insure efficient assimilation and utilization of the minerals by the animal body.

This paper will be confined to nutritional deficiencies in cattle in general and dairy cattle especially. The very nature of the dairy cow and the tremendous effort she is called upon to make in the production world render her more readily susceptible or liable to deficiency disturbances than her sister, the beef cow.

Milk secretion is a perfectly normal phenomenon in all parturient mammalia. However, in the case of the present-day dairy cow, which in reality is called upon to function like a supermachine, she is often forced and pushed to the limit—yes, to the very breaking-point—striving for that much coveted goal, a milk-production record. What a contrast when we compare such an animal with the normal lactating females in the beef breeds and those of other species of animals that more closely follow the even tenor of nature's dictates.

Milk is a highly complex liquid food of varied nutritive constituency among which is a high percentage of mineral, particularly calcium. Phosphorus, as such, does not appear in very large quantity in secreted milk. Nevertheless, it is quite essential as an auxilliary in the utilization and production of calcium. Therefore, instead of speaking only of calcium requirements, it is more important to consider the calcium-phosphorus (Ca/P) complex.

Tremendous Calcium Drain Placed on Lactating Cow

The secretion of 40 to 60 or more pounds of milk daily involves a tremendous calcium drain on the lactating cow. This calcium output or loss must be supplied in the food rations in a utilizable form or it is taken up from the body tissues. Consequently, if the rations are deficient in the Ca/P requirements, the body structures in general and the bones in particular gradually become depleted of their calcium reserve and grave disturbances rapidly ensue.

In the brief interval of time that specific studies have been conducted in health irregularities, presumably due to nutritional deficiencies, many things of an enlightened nature have been learned. Of exceptional interest, in the more recent years, in many sections of the United States and perhaps equally well in several European countries, South Africa and Australia, where the present economic stress is quite pronounced, there has developed a group of conditions, entitled, "bone-, wood- and leather-chewing," "soil eating" and "licking" diseases among cattle. All of these symptoms are undoubted evidences of deficiency, primarily phosphorus, and possibly calcium secondarily, which apparently can be classed as some form of osteomalacia.

Maurer[1] and Tgetgel[2] describe epizoötic outbreaks of this disease in Switzerland. Maurer sprayed all the objects subject

to chewing, as well as the pasture-grass, with strong saline solutions. The resulting thirst which causes these animals to take milk and to eat grass again was found to be of special value in the prescribed course of treatment. Tgetgel mentions as the predisposing moment the insufficient intake of phosphate of lime, individual disposition, faulty hygienic conditions and lack of vitamins. He found that the disease becomes aggravated during lactation, from lack of air, sun and exercise, and when feeding spoiled dry feed.

Biochemistry of Osteomalacia

Becka[3,4] occupied himself chiefly with research into the origin, prophylaxis and therapy of osteomalacia from the biochemical point of view. He considers osteomalacia a dysfunction of the calcium metabolism, which progressively passes into a local and later a general acidosis. The regulation of the Ca metabolism is brought about by magnesium, which forms a buffer for the entire mineral balance. It carries the Ca in the body in the proportion 1:10. Depending on the kind of anion combined with Mg, the combination may either bind the Ca or expel it. These Mg compounds may be divided into three groups, according to their behavior toward Ca. Combinations which inhibit the resorption of Ca and cause its loss through urine and feces are sulfates, carbonates, and acetates of magnesium. Combinations which promote the resorption of Ca and retain it for about 24 hours are chlorids, lactates and phosphates of magnesium. Combinations which promote the resorption of Ca and retain it for a long time in the body are glycuronate of magnesium and colloidal magnesium hydroxid. The latter fixes the Ca in the proportion 1:70 for 10 to 15 days. The Ca is biologically active and is excreted by the kidneys. Fresh chlorophyll, chlorophyll dried at 40°C. or chlorophyll conserved by lactic acid fermentation belong in this group of Mg chlorates and Mg hydroxids. Chlorophyll will denature through the influence of heat, drouth and acetic fermentation (silage) and thus change to a combination of the sulfate type which disturbs the Ca metabolism. This is the reason why osteomalacia occurs after the feeding of burnt hay. The prophylaxis and therapy of osteomalacia consist in substituting for feeds denatured in regard to their chlorophyll content, others of the correct magnesium content. Care is to be taken that other factors of Ca metabolism are present.

Schermer and Hofferber[5] showed that the blood serum examination for P and Ca content will reveal latent cases of osteo-

malacia. They had best results with treatment when giving activated ergosterol (viosterol) intravenously.

Muller-Lenhartz[6] points out the dysfunction of bowel activity as a predisposing cause of osteomalacia by causing a loss of bases, making the resorption of vitamins difficult. This condition develops most often from feeding fermenting feeds, small amounts of hay, especially leguminous hays, and concentrates unaccompanied by appropriate mineral mixtures. Overfeeding with acid feeds and feeding of too small amounts of hay not only cause deficiency of bases in the organism but also deficiency of fat-soluble vitamins.

Relation of Drouths to Coccidiosis

Pirani[7] is led to believe that shortness of feed plays a predisposing rôle in the virulence of coccidiosis in cattle. In years of severe drought, especially during the months of November and December, the disease increases in severity and mortality, in many localities where outside feed is scant and lot or stable feeding is not sufficient. This may explain why the occurrence of the disease seems to run parallel with the approach of more severe winter weather, and why infestation fails to appear more often during the summer months when the animals are on abundant pastures.

This seems quite plausible in view of the fact that Ackert and coworkers[8,9] were able to demonstrate that lack of vitamins A and B may be a factor in the case of parasitism in chickens.

Wester,[10] in a series of articles, reviews the etiology, morbid anatomy, symptomatology and therapy of rachitis, osteomalacia and osteofibrosis of domestic animals.

Küst[11] contends that performances in cattle breeding have been pushed to the limit and that the high yields have been obtained by forced inbreeding and perverse nutrition. He says that diseases have not been due to high demands only but also to lack of certain properties essential for maintenance of life. He discusses tetany of young animals which he has seen often develop into rickets and which may therefore aptly be termed a preliminary stage of rickets. In tetany the Ca value of the blood serum is decreased, distinguishing it in this respect from rickets in which the quotient Ca/P increases.

Goetze,[12] writing about the grass-tetany (grass-staggers), says there is a possible assumption for the existence of a D avitaminosis in human tetany, although which rôle the vitamin and the

related internal secretion play in the etiology of grass-tetany is unknown.

Sjollema[13] maintains that under certain predisposing conditions of feeding a labile state is set up in cows and disturbance of the equilibrium will cause grass-tetany. The calcium content of the blood serum was found to be very low.

During the last few years nutritional deficiency and its possible relationship to the incidence of Bang's disease (infectious abortion) has received considerable attention among research workers throughout the U. S. However, much of this work is still in its procreative stage and not yet ripe for definite conclusions. As early as 1922, Dr. G. H. Conn[14] pointed out the correlation between mineral deficiency and abortion as well as sterility, basing his statements and his observations on still earlier work at the University of Wisconsin.

Vitamin Deficiency and Nymphomania

Küst[15] observes that vitamin deficiency and nymphomania frequently occur in animals at the same time. His quest into the etiology led him to the conclusion that there must be some connecting link between ovarian disease and its sequel, nymphomania.

In this connection it is interesting to note that Spicer[16] is inclined to view nymphomania as a deficiency disease, attributing it to a lack of iodin in the ration.

Du Toit and Bischop[17] showed that the gravid animals grazing on mineral-deficient pasture exhaust their mineral reserves during gestation and generally will need two seasons or more to build up their reserves again before they will become pregnant once more.

Hadley and Hawn,[18] in their preliminary experiments, did not find any definite relationship between a ration deficient in lime and protein and the susceptibility to infectious abortion in cattle.

Erf (unpublished compilation) discusses in a lengthy survey of the literature the iodin deficiency in cows. This review states that if the blood does not contain a sufficient quantity of iodin, calcium, iron and other minerals or hormones of any of the various glands of internal secretion, the activity of the ovary, for instance, will be affected accordingly. Since the hormones from the various glands of internal secretion are chemical compounds of definite character, it would seem that disturbances of function

of the ovaries and uterus are due to too much or too little of some material in the circulating blood. Iodin seems to be one of the important factors that influence this material.

Another achievement of recent research is that it has been shown that loin disease in Texas (Schmidt[19]), carrion poisoning in Australia (Seddon[20]), and lamziekte in South Africa (Theiler[21]) are identical in that the phosphorus deficiency of the rations causes these cattle to satisfy their need for the mineral by gnawing the bones of cadavers, thus exposing themselves to botulism and parabotulism.

Du Toit and Green[22] found that dicalcium phosphate is a more effective and relatively much cheaper source of phosphorus than bone meal for cattle grazing on pastures deficient in phosphorus.

Bongert[23] concludes from his experiments that the irradiation of cows for the purpose of increasing the vitamin content of the milk is inoperative in animals. He compares the intestinal disturbances and pica-like symptoms, observed in calves fed on boiled milk, to the scurvy of infants and guinea pigs, brought about by the destruction of vitamin C through heating milk.

Gminder[24] mentions a peculiar avitaminosis observed in Wurttemberg, manifesting itself primarily by extensive eczematous skin lesions. The feed was of very poor quality and came from lime-deficient soils. While apomorphin would improve the condition, cod-liver oil alone was found to give permanent recovery. It is concluded, therefore, that the author was dealing with some form of avitaminosis.

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CLINICAL STUDIES ON RETAINED PLACENTA IN THE COW*

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Many methods have been recommended, from time to time, for the treatment of retained placenta in cows. Every veterinarian who has had an extensive experience in treating these cases probably feels that he has worked out a method of treatment which, upon the whole, is proving satisfactory. A survey of the methods of treatment reveals a wide variation in the technic employed, varying all the way from that advocating early manual removal, to that of no treatment at all. Between these two extremes may be found a wide variety of variations in method. The methods of treatment are not only numerous, but the popularity of a given method varies from time to time. These changes in style are brought about by the publicity given to a method of treatment recommended by some prominent member of the profession. But as there are many prominent members of the profession throughout the world, and as retention of the placenta is of frequent occurrence and, therefore, frequently a subject of discussion, new or modified methods of treatment are advocated frequently.

It is not the purpose of this report to advocate any change in the style or methods of treatment now in use, but rather to present the results of a clinical study in which an attempt has been made to establish a standard for measuring the value of any given line of treatment. Some of the methods in vogue today are more or less haphazard and unscientific. They are methods which were originally employed by the layman or the dairyman and have been copied by the veterinary practitioner. Others are more scientific, but the difficulty in appraising the value of any method of treatment lies in the fact that we possess no standard by which the method may be measured. When a worker, employing a given method of treatment, reports his results upon a series of cases in which he has obtained excellent results, how are we to judge, if a standard for measurement is not available, whether or not another method of treatment, or possibly no treatment at all, would not have produced just as excellent results?

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Like many others engaged in treating cases of retained placenta in cows, the writer, after considerable experimentation with some of the methods of treatment which have been recommended, worked out a method which was believed to be satisfactory. When it came to an appraisal of the method, and to judging its real value to the animal, it was discovered that there were no data available by which it was possible to judge the merit of the treatment. It was decided, therefore, to make an attempt to collect data from which a standard for measurement might be established.

Working out the Standard

In establishing a standard which could be employed for purposes of comparison and for accurately measuring the value of a line of treatment, it appeared that the logical method of procedure would be first to chart the purposes or objects to be gained by the treatment. Then by collecting data as indicated by the chart or outline, employing for this purpose a group of experiment animals in which the placenta was retained and which received no treatment, certain statistics could be compiled which would serve as a standard for comparison. When the value of a given line of treatment was to be judged, similar statistics would be compiled from animals receiving the treatment, and then by comparing these data with the standard compiled from untreated cases, the real value or worth of the treatment would be established.

In charting the purposes or objects to be accomplished by the treatment, the following were listed:

1. To prevent the loss of life of the animal. A mortality table is not available for this disease in so far as the writer is aware. It is important to learn the death rate in cows which retain the placenta. This may be established by collecting data upon the number of deaths which occur in untreated cases.

2. To bring the cow into normal milk production as soon as possible after calving. Data compiled from testing for the advanced registry reveals that, in cows calving normally, maximum production is attained at fourteen to twenty-one days following birth of the calf. By recording the daily milk production in a group of untreated cows with retention of the placenta for the first two or three weeks of lactation, a standard for milk production may be established.

3. To prevent the loss of body weight. In a normal cow, the weight of the cow after calving should be maintained throughout

the two weeks following calving. By recording the weights of untreated cows with retained placenta during the interval, a standard for body weight may be established.

4. To prevent the loss of the appetite. In healthy cows calving normally, no impairment in the appetite occurs. It has been observed that the appetite of the cow following the birth of the calf is one of the best guides in ascertaining the return to normal following the incidence of birth. As a general guide at this time, the writer believes the appetite is superior to the body temperature or to other symptoms. The loss of the appetite following calving usually indicates grave complications. *It is believed, therefore, that the appetite is of great value in judging the recovery of cases of retained placenta.* By recording the state of the appetite in a group of untreated cows retaining the placenta, a standard for the appetite may be established.

5. To prevent the development of septic diseases. By determining the number of cases of septic disease, such as metritis, septicemia, sapremia, pyemia, mastitis, etc., in a group of untreated cases, a standard for this factor may be established.

6. To prevent sterility. A standard for this factor may be established by determining in a group of untreated cases the number of cows which become non-breeders. This would show the amount of permanent sterility. As sterility may be only temporary, the degree of the temporary sterility may be measured by determining the number of services required for each pregnancy in the untreated group; also, by determining the number of days elapsing between the calving date, when the placenta was retained, and the subsequent calving date, provided, of course, the calf was carried the full term.

7. To prevent abortion of the next calf. This factor may be established by recording the number of abortions occurring in a group of cows which had retained the placenta at the preceding calving and which received no treatment. The value of such a standard may be questioned, however, as many factors other than retention of the placenta may be responsible for the abortion of a fetus. If it is used, the data should be compiled from cows which are free from Bang's disease.

8. For sanitary reasons. A cow with a retained placenta usually has a discharge, which is important from a sanitary milk supply standpoint. One of the objects of treatment, therefore, is to shorten this period as much as possible. It is difficult to employ this factor in making a standard for judging the value of

a method of treatment for the reason that some cows which do not retain their placenta have a discharge following calving. Furthermore, it is of doubtful importance, as the removal of all fresh cows from the milking herd is a sanitary practice to be recommended and is being employed in many modern dairies. Consequently, the cow with retained placenta does not differ materially, from a sanitary standpoint, from a normal fresh cow.

A standard prepared on the basis of the above outline should be made from data compiled from a large group of animals. This report is open to criticism for its weakness in this respect.

How the Statistics Were Compiled

As it is usually customary, in progressive dairy localities, for cows with retained placentas to receive treatment of some kind, it is difficult to obtain data upon untreated cases. The cows, from which the data for this report were collected, were members of two herds of pure-bred dairy cattle. One herd consisted of approximately 100 milking cows, the other of about 25 milking cows. Both herds belonged to the same breed of cattle. They were located about fifteen miles apart. The two herds were similar in blood lines, both carrying a large percentage of the blood of an outstanding family of the breed, due to the interchange of females and especially to the use of herd sires carrying this blood. The feeding and management practices were similar in both herds. Both herds have been free of tuberculosis and Bang's disease for several years.

The data for each case were recorded upon mimeographed sheets prepared specifically for this study. Throughout the years 1927, 1928 and 1929, there became available for this study 44 cases of retained placenta, which remained in the herds a sufficient length of time to make it possible to collect all of the data desired for each case. Ten of these cases came from the small herd and thirty-four from the large herd.

From the mimeographed sheets the data were transcribed to a chart, but as this chart is too voluminous and inconvenient for publication, an attempt has been made to subdivide the material into smaller tables which summarize the data.

It was planned to give no treatment to each case unless it appeared that the life of the animal was endangered. As matters turned out, it was considered advisable to treat four of the cases. It is believed that these cases would not have terminated fatally if they had been permitted to go untreated, but as the animals

were all valuable pure-breds, we were not in a position to sacrifice their lives if they could be saved. This fact may or may not explain that no deaths occurred in the group.

For each case of retained placenta occurring in either of the two herds, a cow calving at approximately the same time and not retaining the placenta was selected from the same herd to serve as a check animal.

Results of the Experiment

Thirty-six of the 44 cows which retained the placenta had delivered calves at full term. Eight (18.2 per cent) had aborted. Seven (16 per cent) had given birth to twins. The placenta was not disturbed in any of the forty-four cases. It was retained for intervals varying from 2 to 11 days; the mean for the entire group was 6.79 days. One animal only passed the placenta on the second day, one passed it on the third day, four on the fourth day, seven on the fifth day, seven on the sixth day, ten on the seventh day, five on the eighth day, four on the ninth day, one on the tenth day, and four on the eleventh day. These data are summarized in table I.

Table I—*Animals retaining the placenta*

Number	Calved at Full-Term	Aborted	Had Twins	Average Number of Days Placenta was Retained	
				Shortest	Longest
44	36	8	7	2	11
	(81.8%)	(18.2%)	(16%)	Mean 6.79	

Table II—*Condition of cow for two weeks after calving*

Appetite			Weight		Milk Secretion			Treated for Septic Disease
Good	Fair	Poor	Normal	Loss	Good	Fair	Poor	
14 (31.8%)	24 (54.5%)	6 (13.6%)	39 (88.6%)	5 (11.3%)	13 (29.5%)	28 (63.6%)	3 (6.8%)	4 (9.0%)

The condition of the 44 cows for the two weeks after calving, as indicated by the appetite, weight and milk secretion, is shown in table II. The appetite is regarded by the writer as a most valuable guide in making a prognosis in cases of retained placenta. This conclusion was reached some years ago and sub-

sequent experience has not changed this conclusion. The writer had never observed a fatal termination or grave complications developing in a case of retained placenta in a cow which retained a good or normal appetite. Six (13.6 per cent) of the 44 cases were recorded as showing poor appetites. In four of the six animals it was considered advisable to administer treatment. These cases will be described later. Of the remaining 38 animals, 14 were recorded as possessing good appetites and 24 as possessing fair appetites. It is recognized that in making this classification some degree of error may occur, owing to the fact that one caretaker might report the appetite of a cow as fair, whereas, if the same cow were under the care of another man, the appetite might be reported as good. For the body weight during the two weeks after calving, 39 of the cows retained their weight, and 5 of the cows lost weight. The milk production for the group was recorded as good in 13 individuals, fair in 28 and poor in 3.

TABLE III—*The four animals receiving treatment during retention of placenta*

ANIMAL	BIRTH AT FULL TERM	DAYS PLACENTA RETAINED	CONDITION TWO WEEKS AFTER CALVING	TREATMENT GIVEN	TIMES BRED	TREATED FOR STERILITY	DAYS BETWEEN CALVES
3	Yes	11	Appetite—Poor Weight —Normal Milk S. —Fair	Irrigated uterus once	4	No	Sold. Pregnant
7	Yes	7	Appetite—Poor Weight —Normal Milk S. —Fair	Irrigated uterus once	1	No	464
41	Yes	10	Appetite—Poor Weight —Normal Milk S. —Fair	Irrigated uterus once	1	No	Aborted 7-mos. fetus
42	Yes	6	Appetite—Poor Weight —Normal Milk S. —Fair	Irrigated uterus once	4	No	448

Four (9 per cent) of the cows appeared to be threatened with the development of a septic disease, as indicated by the loss of appetite, and accordingly were treated. As none of the four actually developed a septic disease, it is believed that 9 per cent is a high estimate for the cases of retained placenta which, when not treated, will develop a septic disease. These four cases are summarized in table III. In treating them the placenta was not removed. The treatment consisted of introducing into the uterus one gram of proflavine in two liters of warm physiological salt solution. If the patient did not show marked improvement

of the appetite within 48 hours, the treatment was repeated. It was not necessary to repeat the treatment in any of these cases. Not only did these four cases make prompt recoveries, but it was not necessary to treat them later for sterility. When bred, two of them conceived at the first service and two required four services to become pregnant. Two of the cows delivered normal calves at full term, one aborted a seven-month fetus, and one was sold when in advanced pregnancy.

The entire group required an average number of 2.5 services per pregnancy. The breeding data are shown in table IV. Thirteen cows of the group conceived at the first service. No animals in the group were examined for sterility unless they were bred three times and continued to show dioestrous cycles or otherwise suggested sterility. Four (9 per cent) of the animals were treated for sterility. These cases will be described later (table V). Three (6.8 per cent) of the animals became sterile. Two of these sterile animals (cows 11 and 30, table V) were in the group receiving treatment for sterility. In addition, another cow (10) became sterile. This animal has the following history: On July 24, 1927, she gave birth to twin calves at full term. At this calving she retained the placenta, which was retained seven days. She had a poor appetite at calving time but was not considered sick enough to demand treatment. She was bred three times and then examined for sterility. Her genital organs were found apparently normal and no treatment was given. She was bred several times after this examination, but did not conceive and was sold eventually for slaughter as a non-breeder. Her genital organs were examined several times but no pathological changes were detected. Table IV also shows the number of abortions for the group, which was six (13.6 per cent). Those animals which conceived and carried their calves the full gestation period required an average of 429.5 days between calves.

TABLE IV—*Animals retaining the placenta*

NUMBER	TIMES BRED		TREATED FOR STERILITY	BECAME STERILE	ABORTED	DAYS BETWEEN CALVES
	MIN.	MAX.				
44	1	8	4	3	6	429.5
	MEAN 2.5		(9.0%)	(6.8%)	(13.6%)	

The details of the four cases which were treated for sterility are shown in table V. One of these was treated for failure to come in heat. After removal of the retained corpus luteum this animal conceived at the first service. She did not, however, deliver a calf at full term but aborted at eight months. Two of the cows treated for sterility were found upon examination to have pyometritis. Both of these animals became non-breeders. One cow in the group treated for sterility had cystic degeneration of the ovaries. Treatment consisted of manual rupture of the cysts. This cow eventually became pregnant, requiring eight services, and delivered a calf at full term and 648 days after her previous calving.

TABLE V—*The four animals receiving treatment for sterility*

ANIMAL	BIRTH AT FULL TERM	DAYS PLACENTA RETAINED	TREATMENT GIVEN	TIMES BRED	DAYS BETWEEN CALVES
1	Yes	5	Twice—failure to come in heat	1	Aborted 8-mos. fetus
11	Yes	11	Pyometritis	8	Sold as non-breeder
30	Yes (Dystokia)	9	Pyometritis	—	Sold as non-breeder
31	Yes	11	Cystic ovaries	8	648

Three cows in the lot became sterile (6.8 per cent). In addition to the above two, cow 10 became a non-breeder. Her genital organs were apparently normal. She was bred 5 times.

In table VI an attempt has been made to compare certain pertinent breeding data of the 44 cows with retained placenta with that of 44 cows calving at approximately the same time and which did not retain the placenta. It will be observed that all of the check cows delivered calves at full term, whereas eight (18.2 per cent) of the retained-placenta cows were animals which had aborted. Although the retained-placenta group received no treatment for the placentitis except as indicated previously, the mean number of services required per pregnancy was the same for both groups. This mean number of services per pregnancy for the two groups is the same as that for the entire herd, based upon statistics compiled from herd records covering several years.

The sterility rate for the two groups is approximately equal. The slightly lower rate for the check group (4.5 and 6.8 per cent) is not great enough to be considered a significant factor. The slightly higher abortion rate occurring in the retained-placenta group as compared with the check group is not great enough to

TABLE VI—*Cows retaining placenta compared with normal cows*

	ANIMALS	CALVED AT FULL TERM	ABORTED	TIMES BRED	BECAME STERILE	ABORTED	DAYS BETWEEN CALVES
Placenta Retained	44	36 (81.8%)	8 (18.2%)	Min. 1 Max. 8 Mean 2.5	3 (6.8%)	6 (13.6%)	429.5
Placenta not retained (Controls)	44	44 (100%)	0.0 (0.0%)	Min. 1 Max. 9 Mean 2.5	2 (4.5%)	4 (9.0%)	419.5

be considered significant. The abortion rate for the herds in which these animals belong has averaged approximately 12 per cent over a period of several years, since they have been free of Bang's disease. The number of days between calves for both groups is considerably greater than the theoretical 365 days which should elapse between calves. This is explained by the fact that in both of the herds in which these animals belong it is the practice to place practically every cow after calving upon semi-official test for the advanced registry and as the majority of the animals are placed upon the "long test" (365 days), they are not bred until approximately three to five months after calving. If it then requires two to three services for the cow to become pregnant, approximately 400 or more days will elapse before the cow again freshens. The average number of days between calves for the retained-placenta group was 429.5, compared with 419.5 days for the check group.

In addition to the data reported above for the group of cows with retention of the placenta, an attempt was made to compare the milk and fat production of this group with production records of the check group. This study was discontinued because of the doubtful value of a comparison made upon this basis and because it was appreciated that variations in milk and fat production may be explained by many factors other than retention of the placenta.

CONCLUDING REMARKS

The study herein reported was undertaken for the purpose of collecting data upon untreated cases of retained placenta which might serve as a basis for judging the merits of a method of treatment.

It is obvious, from the data submitted, that it would be difficult for any method of treatment to make a better showing than that made by the untreated cases. A study of table VI, in which the untreated, retained-placenta cows are compared with a similar number of normal or check cows, reveals the untreated, retained-placenta group made a breeding record approximately equal to that made by the check group.

It is recognized that the number of cases from which this study was made is too small to warrant the drawing of any definite conclusions. The material for this report was obtained from animals in only two herds of cattle. It should be remembered that placentitis may be caused by a number of bacterial factors, and that the disease may be more serious in one herd than in another.

Although the data submitted are favorable to the opinion of those who advocate no treatment in this disease, the writer does not wish to leave the impression that the meager data submitted have won him over to this school of thought. It should be remembered that we are dealing with a disease which may develop important complications, that each case constitutes an individual problem, and that all cases should be under the observation and treatment of a skilled person.

It is believed that this study does show that nature has provided a fairly good mechanism for taking care of these cases. In treating them, therefore, care should be exercised not to disturb nature's healing processes. The object of treatment should be to assist nature as much as possible.

A word of caution is advised against too heroic methods of treatment. Regard each case as an individual problem, make a study of it and in giving treatment do not forget that nature's healing processes are giving valuable assistance which should not be counteracted. It is the writer's opinion that early, forcible, manual removal is actually detrimental to some cases and when used should always be supplemented with follow-up treatment. Remember that the object of treatment should be: first, to save the life of the cow; second, to prevent the development of septic disease; third, to restore the patient to a normal breeding status. It is therefore important to keep in close touch with these cases until the patient is successfully bred and pronounced pregnant.

REPORT OF FUTHER WORK ON THE RELATION OF BACT. ABORTUS BANG TO FISTULA AND POLL-EVIL OF HORSES*

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Fitch, Delez and Boyd,[1] in 1929, made a preliminary report on the presence of *Bact. abortus* Bang in fistula and poll-evil of horses. This followed the original work of Rinjard and Hilger on the pyogenic localization of Bang infection in horses. Since this report, we have continued our work and desire to present the results obtained.

The literature contains very few accounts of the localization of *Bact. abortus* Bang in the body of equines. In addition to the references cited in the previous article, we find that Cesari[2] presented to the French Veterinary Society, in 1923, an extensive report on the prophylaxis of Mediterranean or Malta fever. In this article he mentions, without giving any references, that Kennedy examined the sera of 87 mules in Malta and found 37 of the sera which feebly agglutinated *Micrococcus melitensis* and 2 which agglutinated in dilutions higher than 1:40. He states that in Sicily, 20 per cent of the horses examined feebly agglutinated the germ of Malta fever. Sargent and Bories examined the sera of 27 horses and mules and found 3 sera agglutinating at 1:30 and 2 at 1:200. Cesari reports further that Dubois found 2 positive sero-agglutinations in the horse.

Van der Hoeden,[3] in 1930, published the results of his investigations in regard to the presence of the Bang germ in horses. Of 424 horse sera examined by him, 254 did not agglutinate *Brucella abortus* Bang in a dilution of 1:50; 99 gave agglutinations in a dilution of 1:50; 50 in a dilution of 1:100; 18 in a dilution of 1:200; and 3 in a dilution of 1:400. He isolated and cultivated the Bang organism in 8 out of 12 samples of pus from fistulous withers and in 1 out of 3 from fistulous neck, or poll-evil. In several instances he was able to obtain a pure culture of *Bact. abortus* Bang directly from the abscesses of the withers. This author further suggests the possibility that various pyogenic infections in the horse might be due to *Bact. abortus*.

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Hulten[4] has reported a case of fistula in an eleven-year-old horse. This fistula had not opened at the time of the operation, and pus and blood samples were sent to the laboratory for investigation. The Bang germ was isolated from the pus by means of guinea-pig inoculation and the blood titre of the horse was 1:200. This horse was located on a small island estate. In 1927, seven cows aborted on this place, and during the winter of 1929-1930, four cows aborted.

Very recently Bennetts and Filmer[5] have reported the testing of blood of horses affected with fistula and poll-evil in Australia:

> These sera were found to give positive agglutination reactions to the standard emulsion of *B. abortus* of bovine origin at 1 to 100 and 1 to 2000 dilutions respectively. As controls, blood sera from three normal horses and from two horses affected with quittor were submitted to the agglutination test. Negative reactions were obtained in all instances.

No attempt was made to cultivate *B. abortus* from the lesions.

Our knowledge concerning Bang infection in horses has been aided by the work of Makkawejsky[6] and his assistants in Russia. They tested the blood of 375 horses which had been closely associated with aborting cattle in 14 agricultural districts. Of these 375 horses, 75 gave a reaction to the agglutination test with the Bang germ in a titre of 1:100 or above. On three different farms 3 mares had aborted, one at four months, one at six months, and one at eight months. These gave titres respectively of 1:400, 1:200 and 1:100. Among the positive-reacting horses, they very often found infections of the knee and fetlock joints, and also swellings on the poll and withers as well as in other places. They found also that the positive horses were not able to work so satisfactorily as those which did not give a reaction. They believe that the animals become infected largely through contact, and possibly through the digestive tract. The authors do not report the isolation of the organism from any case.

We have examined in this series 61 blood samples from different cases of fistula and poll-evil of horses. Of this number, 48 (78 per cent) have had an agglutination titre for the Bang germ of 1:100 or above. We have also examined 31 specimens of pus coming from cases of fistula or poll-evil. We have isolated the Bang germ from 7 cases (22 per cent). Details of these examinations are given in table I.

Rinjard and Hilger heated the serum which they tested at 56° C. for varying lengths of time before they combined it with the antigen. We have heated certain of the sera and have also tested the same sera before heating. The results of these exami-

TABLE I—*Results of examinations of specimens from cases of fistula and poll-evil of horses*

CASE	DATE	TYPE OF CASE	RESULTS* OF EXAMINATION OF PUS	RESULTS OF AGGLUTINATION TEST*	HISTORY
	1929				
1	May 11	Fistula	None obtained	+ + + I − −	Operated. Nice recovery
2	May 11	Fistula	None obtained	+ + + + + −	Active
3	May 14	Fistula	None obtained	+ − − − − −	Cured about one year
4	May 14	Poll-evil	None obtained	+ + + + − −	Cured about one year
5	May 14	Shoulder Abscess	Negative for *Bact. abortus*	Blood not obtained	Active
6	May 14	Shoulder Abscess	Negative for *Bact. abortus*	Blood not obtained	Active
7	June 13	Fistula	None obtained	− − − − − −	Case of 6 mos. standing
8	June 18	Fistula	None obtained	+ + + + + +	None given
9	June 18	Fistula	None obtained	− − − − − −	None given
10	June 18	Fistula	Negative for *Bact. abortus*	− − − − − −	None given
11	July 3	Fistula	None obtained	+ + + + + I	Active case
12	July 23	Poll-evil	Negative for *Bact. abortus*	Blood not obtained	No history
13	Aug. 14	Fistula	None obtained	+ + − − − −	Two years standing
14	Aug. 19	Fistula	None obtained	− − − − − −	None given
15	Aug. 19	Fistula	None obtained	+ + + + − −	None given
16	Aug. 21	Fistula	None obtained	+ + + + + +	None given
17	Oct. 17	Fistula	None obtained	+ + + + + +	None given
18	Oct. 19		Negative for *Bact. abortus*	+ + + + + +	None given
19	Oct. 19		Negative for *Bact. abortus*	+ + + + + −	None given
20	Oct. 19		None obtained	+ + + + − −	None given
21	Oct. 19		None obtained	− − − − − −	None given
22	Oct. 19		None obtained	+ − − − − −	None given
23	Oct. 19		None obtained	+ + + + + −	None given
24	Oct. 31		Negative for *Bact. abortus*	Blood not obtained	None given
25	Nov. 4		None obtained	+ − − − − −	None given
26	Nov. 15		Positive for *Bact. abortus*	Blood not obtained	None given
27	Dec. 2		Negative for *Bact. abortus*	+ + + + + +	None given
28	Dec. 6	Poll-evil	Positive for *Bact. abortus*	+ + + + + +	None given
29	Dec. 6	Fistula	None obtained	+ + + + + +	None given
	1930				
30	Jan. 13	Fistula	None obtained	+ + + + + +	None given
31	Jan. 13	Fistula	None obtained	+ + + + + +	None given
32	Jan. 31	Poll-evil	Positive for *Bact. abortus*	Blood not obtained	None given
33	Feb. 20	Fistula	None obtained	+ + + − − −	None given
34	Feb. 20	Poll-evil	Positive for *Bact. abortus*	+ + + + − −	None given
35	Feb. 20	Fistula	Positive for *Bact. abortus*	+ + + + − −	None given

TABLE I—*Continued*

CASE	DATE	TYPE OF CASE	RESULTS OF EXAMINATION OF PUS	RESULTS OF AGGLUTINATION TEST*	HISTORY
36	March 14		None obtained	+ + + − − −	None given
37	March 14		None obtained	+ + + + + −	None given
38	March 14		None obtained	+ + + + + +	None given
39	March 14		None obtained	+ + + + + +	None given
40	March 31		Negative for *Bact. abortus*	+ + + + + +	None given
41	March 31		Negative for *Bact. abortus*	+ + + + + +	None given
42	April 17		Negative for *Bact. abortus*	+ + + + + +	None given
43	May 12		Negative for *Bact. abortus*	+ + + + + +	None given
44	May 31	Fistula	Negative for *Bact. abortus*	+ + + + + +	None given
45	June 17		Negative for *Bact. abortus*	+ + + + + +	None given
46	July 16	Fistula	Positive for *Bact. abortus*	+ + + + + +	None given
47	Aug. 25	Poll-evil	None obtained	+ + + + + +	Operated, Aug. 4, 1930
48	Aug. 25	Poll-evil	None obtained	+ + + + − −	Operated, Aug. 18, 1930
49	Aug. 25	Fistula	None obtained	+ + + + + +	Operated, Aug. 19, 1930
50	Aug. 25	Fistula	Negative for *Bact. abortus*	+ + + + + +	Recent. Active
51	Aug. 25	Fistula	None obtained	+ + + + + +	Recent. Active; also developing poll-evil
52	Aug. 28	Fistula	Negative for *Bact. abortus*	+ + + + + +	About a quart of fluid in the bursa and some coagulum
53	Oct. 3	Fistula	None obtained	+ + + + + +	None given
54	Oct. 20	Fistula	Negative for *Bact. abortus*	+ + + + + +	Sudden occurrence. Not operated
55	Nov. 12	Fistula & poll-evil	Negative for *Bact. abortus*	+ + + + + +	None given
56	Nov. 12	Fistula	Negative for *Bact. abortus*	+ + + + + +	None given
57	Nov. 19	Fistula	Negative for *Bact. abortus*	Blood not obtained	Open at one place
58	Nov. 19	Fistula	Negative for *Bact. abortus*	I − − − − −	None given
59	Nov. 19 1931	Fistula	None obtained	− − − − − −	None given
60	Jan. 31	Fistula	Negative for *Bact. abortus*	+ + + + + +	None given
61	Feb. 7		Negative for *Bact. abortus*	+ + + + + +	None given
62	March 5	Fistula	None obtained	+ + + + + +	None given
63	March 26	Fistula	Negative for *Bact. abortus*	+ + + + + −	None given
64	April 29	Fistula	None obtained	+ + + + + −	Old fistula

TABLE I—*Concluded*

CASE	DATE	TYPE OF CASE	RESULTS OF EXAMINATION OF PUS	RESULTS OF AGGLUTINATION TEST*	HISTORY
65	April 29	Fistula	None obtained	+ + + + + +	None given
66	May 11	Fistula	Negative for *Bact. abortus*	+ + + + + −	None given
67	May 21	Fistula	Negative	+ + + + I −	Recent. Active
68	May 29	Fistula	Positive for *Bact. abortus*	+ + + I − −	Recent. Active

*The dilutions used are 1:25; 1:50; 1:100; 1:250; 1:500; 1:1000 unless titre is indicated.
+ = Complete agglutination
I = Partial agglutination
− = No agglutination

SUMMARY

31 pus examinations; 7 cases positive (22.6 per cent).
61 blood examinations; 48 had titre of 1:100 or above (78.6 per cent).

nations are given in table II. It will be noted further that maximum titres have been run on these sera, to determine not only the power of the agglutinin contained but also to learn whether it was modified by heat at this temperature. The details of this work are given in table II.

We have been able to type, by means of the dye method, eight strains of *Bact. abortus* which we have isolated from horses. Two strains were lost before they were typed. It will be noted from

TABLE II—*Results of agglutination blood tests on equine sera showing maximum titres*

CASE	UNHEATED SERUM	HEATED SERUM*	CASE	UNHEATED SERUM	HEATED SERUM*
1	1:100	1:100	44	1:2000	1:2000
2	1:500	1:250	45	1:4000	1:2000
3	1:25	No titre	46	1:4000	1:5000
4	1:250	1:250	47	1:1000	1:1000
13	1:50	1:100	48	1:500	1:1000
15	1:250	1:500	49	1:7000	1:6000
19	1:500	1:500	50	1:2000	1:2000
22	1:25	1:25	51	1:5000	1:5000
23	1:500	1:250	52	1:5000	1:5000
25	1:25	1:25	53	1:2000	1:1000
30	1:2000	1:2000	54	1:1000	1:1000
31	1:3600	1:2000	55	1:3000	1:3000
33	1:100	1:100	56	1:4000	1:4000
34	1:250	1:250	60	1:2000	1:2000
35	1:250	1:500	62	1:1000	1:1000
36	1:100	1:100	63	1:500	1:100
37	1:500	1:1000	64	1:500	1:500
38	1:21,000	1:21,000	65	1:3000	1:3000
40	1:5000	1:5000	67	1:250	1:250
41	1:4000	1:4000	68	1:100	1:100

*Heated at 56° C. for 30 minutes in the water-bath.

table III that five typed as bovine strains and three as porcine strains. No strains of melitensis have yet been found in horses.

TABLE III—*Strains of Bact. abortus isolated from equines typed by the dye method*

CULTURE	TYPE
36 old series	Bovine
43 old series	Bovine
44 old series	Bovine
28 new series	Porcine
34 new series	Porcine
35 new series	Bovine
46 new series	Porcine
68 new series	Bovine

The results of the re-tests of apparently normal horses over a period of more than two years are very interesting. These animals were mentioned in our previous article. They have continued under our constant observation as they are a part of the "working and breeding force" of horses at University Farm. It will be noted that during this two-year period they have maintained nearly a constant blood titre for *Bact. abortus*. In the case of Osanan's Blossom, this titre is approximately 1:200. These animals show absolutely no evidence of fistula or poll-evil or any other disease which can be ascribed to *Bact. abortus*. Details are given in table IV.

TABLE IV—*Results of re-tests of apparently normal horses*

HORSE	3-8-29	5-14-29	7-3-29	4-27-30	3-24-31
Jupiter's Queen	+ + − − − −	+ + P − − −	+ + P − − −	+ + + − − −	+ + + − − −
Osanan's Blossom	+ + + + − −	+ + + + − −	+ + + P − −	+ + + + − −	+ + P − − −
Carnation	+ + + − − −	+ + + − − −	+ + + − − −	+ + + − − −	+ + P − − −

We have attempted to produce fistula and poll-evil in horses by injection of different strains of *Bact. abortus* Bang. We have used five horses. These have ranged in age from five to fifteen years. Various methods and materials have been used in making these inoculations. The details are given in the following protocols:

Horse 1: Aged animal, purchased Aug. 31, 1929. Blood test, made Sept. 4, 1929, negative. Sept. 6, given intravenously 2 cc of a milky suspension of a culture of *Bact. abortus* Bang obtained from a case of fistulous withers. This culture typed as bovine. A very decided reaction took place, evening temperature going to 104.5°F. Blood reaction Sept. 17, 1:1000; Oct. 17, 1:250; Nov. 7, 1:100. On this date, 4 cc of a milky suspension from the same strain of *Bact. abortus* was injected into the withers. Blood reaction Nov. 12, 1:100; animal killed Dec. 11, 1929.

Blood reaction at this time was 1:100. No visible lesions were found and the organism was not recovered on culture or animal inoculation, from any of the organs.

Horse 2: Purchased Oct. 7, 1929. Blood test, Oct. 7, 1929, 1:25 titre; Nov. 7, negative. On this latter date, 4 cc of a milky suspension of *Bact. abortus*, of the same strain as used on horse 1, was injected between the two portions of the *ligamentum nuchae* on the poll. Blood reaction Nov. 12, 1:50. On Dec. 13, blood reaction gave a maximum titre of 1:2000. On this date a swelling, about 4 inches in circumference, was noted on the poll. The horse was killed and autopsied, and an abscess was found involving the neck ligament and fascia. There was about 8 cc of thick, stringy pus in this abscess. The abscess extended posteriorly about 5 inches from the crest of the poll. *Bact. abortus* was isolated from the pus and sections taken for microscopic examination of the ligament showed a typical necrotic process.

Horse 3: Purchased Nov. 17, 1929. Blood reaction, Nov. 20, partial at 1:50. Nov. 22, injected intravenously with 10 cc of a milky suspension of a strain of *Bact. abortus* obtained from a case of fistulous withers. Unfortunately this strain was not typed, prior to injection. Blood reaction, Dec. 11, 1:1500; Feb. 24, partial at 1:500; April 15, complete at 1:500. On this latter date (April 15) the skin was shaved over the right side of the withers and was scratched rather deeply with a hypodermic needle. A milky suspension of the same strain of *Bact. abortus* that was previously injected into the animal was rubbed into the skin. A pronounced local reaction in the scratches was noticed. April 21, blood reaction positive at 1:1000. April 28, partial at 1:1000. May 26, partial at 1:500. Animal was killed June 13, 1930. No visible lesions were found and *Bact. abortus* was not recovered from any of the organs.

Horse 4: Purchased Sept. 15, 1930. Blood reaction, Sept. 16, partial at 1:25. On Sept. 19, five drops of a milky suspension of a strain of *Bact. abortus*, obtained from a fistulous withers which typed as porcine, were placed in the conjunctival sac of the left eye. On Sept. 20, appetite began to fail. Temperature on Sept. 23 was 102° F. Only a very slight reaction was noted in the eye until this date, when a pronounced conjunctivitis was found. This had disappeared by Sept. 26, and at this time the horse was apparently normal and had begun to take his normal rations. Blood titre began to rise on Oct. 1, when it was partial at 1:100. On Oct. 28, blood titre was incomplete at 1:500. On Oct. 29, four drops of a heavy suspension of the same type of organism as previously injected (porcine) were placed in the left lip sac. There was no local reaction following this inoculation. Blood reaction on Nov. 6, incomplete at 1:500. On Nov. 14, blood reaction positive at 1:1000. Following this time the titre gradually fell until May 23, 1931, when the titre was incomplete at 1:100. During this period the animal remained apparently normal and is apparently normal at present Cultures and animal inoculations made from the blood of this horse failed to show the presence of *Bact. abortus* Bang.

Horse 5: Purchased Sept. 15, 1930. Blood agglutination test, Sept. 16, 1930, negative. Sept. 19, 50 cc of a milky suspension of *Bact. abortus* of porcine type, isolated from an equine was given per os by means of a syringe. A considerable amount of this material was thrown out by the animal. Blood tests Sept. 24, negative. Oct. 1, about 500 cc of the stomach contents of an aborted bovine fetus were given by means of a stomach-tube. Type of culture obtained from fetus—bovine. Blood titre remained negative until Oct. 6, when there was an incomplete agglutination at 1:25. On Nov. 1, positive at 1:100. This animal showed no systemic effects of the injections. Blood titre reached a maximum on Nov. 17, at an incomplete at 1:500. From this time it gradually fell until May 11, 1931, when it was incomplete at 1:50. This animal shows no visible symptoms of any disease which can be ascribed to *Bact. abortus* and is apparently normal at the present time. It is still under observation. Blood cultures and animal inoculations of the citrated blood from this animal have been made at various times and in no instance has *Bact. abortus* been isolated.

Discussion

Further work confirms the statement made in our previous article that *Bact. abortus* Bang is associated with fistula, poll-evil and other pyogenic infections of horses. This has been confirmed also in Holland, Sweden, Australia and Russia. Cases which we have examined have come from the central and eastern portions of the United States. We have been able to secure the coöperation of a number of veterinarians in various sections of the country, who have kindly sent us the specimens upon which we are now reporting. The material which we have received indicates that the cases of fistula and poll-evil in the larger cities are not so commonly associated with the Bang infection as those from country districts. We have not, however, received a sufficiently large number of specimens from city districts upon which a definite statement on this point can be made.

The significance of the presence of agglutinins for the Bang germ in the blood of horses cannot at this time be accurately evaluated. The three animals which we have followed carefully over a period of more than two years, which carry agglutinins at a titre of at least 1:100 during this period, indicate that the presence of agglutinins at this titre, in the blood of a horse, is not positive evidence of the presence of an active disease. We believe, however, that it indicates association with *Bact. abortus* Bang, as the large number of apparently normal animals, which we have tested and reported in the previous article, indicates that the majority of horses do not carry agglutinins for this organism in their blood. Veterinarians and laboratory workers, however, should bear in mind the fact that the presence of agglutinins for the Bang organism, in the blood of equines, is not definite evidence that active disease is present in these animals.

Our work shows that very high titres for *Bact. abortus* may be present in the blood of equines. The maximum that we have found to date is 1:21,000. We have found also that the heating of the blood serum does not seem to affect the titre of that serum for *Bact. abortus*. We do not believe, as evidenced by the results here reported, that heating of the blood serum at 56° C. for 30 minutes is of any value in assisting the test-tube agglutination test for the presence of agglutinins for the Bang germ.

The different members of the genus Brucella are not yet sufficiently studied to enable one accurately to set aside various strains which may be encountered. This problem is being

actively attacked by research workers not only in this country but abroad. At the present time, in our judgment, the dye method described by Huddleson seems to offer the most reliable means for the separation of the different types of these germs. The application of this method to the organisms which we have isolated from horses shows that both porcine and bovine types are present in these animals. The data now available indicate that the number is pretty evenly divided between these two strains, namely, the porcine and the bovine. We have failed to find, up to the present time, any para-melitensis or melitensis types in horses in this country. The work reported by Cesari indicates that in Europe the finding of melitensis types in horses in certain sections would be quite likely.

Inoculation experiments indicate that fistula and poll-evil of horses are not easily produced by the Bang germ. Various methods of infection have been attempted, namely, through the conjunctival sac, through the digestive tract by way of the mouth, intravenous injection, and through the skin.

Undoubtedly there is a great deal of variation in the susceptibility of different horses to *Bact. abortus* Bang. Recent studies indicate that the same thing is true of human beings, and a further analogy is the fact that some human beings, who have never shown any symptoms of undulant fever, have agglutinins in their blood for the Bang germ. At least symptoms have never been recognized in these persons. Our experiments indicate further that the injection of *Bact. abortus* directly into the neck ligament will produce a process which is closely related, if not identical, with what is commonly spoken of as poll-evil. In other words, *Bact. abortus* Bang, when injected into a horse, may produce pyogenic infection. The presence of fistula and poll-evil in horses of any age does not indicate that age plays any considerable part in resistance. To be sure, fistula and poll-evil are largely diseases of animals over three years. It is possible that the young of equines have considerable resistance to the germ, as is the case of young cattle and of babies, although in these latter groups an absolute resistance is not present. It is impossible at this time to state in what manner the Bang organism gains entrance to the body of the horse under natural conditions. It is probable, in the light of the knowledge of these experiments and that of other species of animals, that the digestive tract and the skin offer the two more probable avenues of entrance.

It is impossible to state definitely what relationship, if any, exists in the presence of the worm, *Onchocerca cervicalis*, in the ligaments, and *Bact. abortus* have to the production of fistula and poll-evil. It is of course possible that the presence of the worm in the ligaments acts as a conveyor of the germs. On the other hand, it would seem to be more likely that the presence of the worms prepared the soil for the growth and multiplication of *Bact. abortus* and rendered the production of suppurative processes possible. We have no definite evidence at the present time that the presence of this parasite has any definite relation to the production of poll-evil and fistulae. This parasite is present to a greater or lesser extent in the ligaments of horses in many sections of the country which are not affected with fistula or poll-evil. It is perfectly within reason, however, to believe that the parasite and the germ work together, or rather one assists the other in the production of fistula and poll-evil. It cannot be longer doubted that *Bact. abortus* is capable of producing suppurative processes in horses.

Our records indicate that *Bact. abortus* is associated with approximately 75 per cent of the cases of fistula and poll-evil. It cannot be stated definitely that this association is in the rôle of the cause of these conditions. However, the presence of this germ or its products in this large number of cases, and its undoubted ability to produce pyogenic processes, indicate that it has a rather close relationship to the etiology of these pyogenic infections.

Conclusions

1. Agglutinins for the Bang germ, in a titre of 1:100 or above, have been found in 48 of 61 samples (76 per cent) of blood coming from horses affected with fistula and poll-evil.

2. Seven cultures of *Bact. abortus* have been isolated from samples of pus examined. This is 22 per cent of the specimens examined for *Bact. abortus*.

3. Agglutinin titres of 1:100 or above are not positive evidence of the presence of an active disease in a horse.

4. Heating equine serum to 56° C. for 30 minutes does not materially alter the agglutinin content for *Bact. abortus* Bang.

5. Horses may maintain a constant titre of 1:100 or above to the Bang organism over a period of two years, and show no evidence of disease.

6. It has been impossible to produce fistula and poll-evil in horses by artificial inoculation except when the organism is injected directly into the neck ligament.

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Protozoan Decimates Ducks

The number of wild ducks, greatly reduced by various adverse conditions, is being still further decreased by a disease caused by a protozoan known as *Leucocytozoon anatis* Wickware, according to a report received by the Bureau of Biological Survey, U. S. Department of Agriculture, from Dr. Earl C. O'Roke, of the School of Forestry and Conservation of the University of Michigan. Doctor O'Roke recently completed his second summer's study of this disease at the University Biological Station, Douglas Lake, and elsewhere in Michigan.

This organism has a complicated life cycle. In certain stages it occurs in the red blood cells, and in others in tissue cells of glandular organs. The parasite is transmitted from duck to duck by the bites of black flies or buffalo gnats. Adult ducks harboring the parasites are apparently little affected by them, but ducklings succumb in large numbers. Death of the duckling may occur at the time of the first appearance of symptoms, but usually it does not take place until the twelfth day after exposure.

The blood of a sick duckling is thin, pale and watery, and contains numerous spindle-shaped parasites somewhat larger than normal blood cells. The most common lesion at autopsy is the greatly enlarged, blackened spleen.

Doctor O'Roke has found the parasite in wild mallards, black ducks, pintails and widgeons, and in several varieties of domestic ducks. The distribution of the disease is spotty, many flocks being entirely free from it, while others are 100 per cent infected. Farmers raising domestic ducks and persons raising wild mallards and black ducks in captivity or on protected areas report losses of from 70 to 100 per cent.

OBSERVATIONS ON PROLAPSE (BLOW-OUTS)

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About three years ago, the senior author was called to a poultry farm for the purpose of finding, if possible, the cause of what the owner and a feed salesman thought to be prolapse of the oviduct in a part of a flock of laying hens. This flock was divided in two equal lots, each lot being housed separately. The owner was conducting a feed test on two well-known brands of commercial feed, evidently for the purpose of settling in his own mind the perpetual question, kept alive by roaming salesmen, "Which is the best feed?" Both lots of chickens were of the same origin and the housing conditions were practically identical. Only one lot of these chickens was affected. Therefore, the feed used for this lot was given all of the blame for the ailment and the owner threatened to discontinue the use of this brand of feed.

In watching these chickens for a while it was noticed that a number of them would strain as if affected with enteritis or diarrhea. While thus straining, several of these chickens were noticed to evert the cloaca and not infrequently the eversion lasted long enough to attract the attention of other chickens which would then peck at the protruding tissues, this in turn resulting in what is commonly known as "pick-outs."

Six birds showing symptoms of straining or evidence of eversion of the cloaca were taken to the laboratory. Five of these birds showed a very heavy tapeworm and some roundworm infestation and the sixth one showed a marked case of enteritis but no worms. No other pathogenic agent was found. A worm treatment, therefore, was recommended, Iodine Vermicide (Merck) being used. Following this treatment prompt recovery was reported.

Since then many reports concerning the rapidly growing importance of this malady have come to our attention, not only from various parts of Michigan, but from other states as well. We have also had occasion to examine a number of birds affected with prolapse, but no definite research was undertaken until February of this year, when two prominent farmers, reporting

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heavy losses due to "blow-outs," asked the Experiment Station to undertake investigational work on their flocks for the purpose of seeing what could be done to check their losses, which had amounted to as much as fifty birds in a single month in a flock of about one thousand chickens.

As a preliminary attempt at finding the cause of this trouble, we decided to collect specimens, in the form of diseased birds from affected flocks once a week for a period of time. After a while specimens were collected once in two weeks. As soon as new chicks were purchased, these were also examined first on the premises and later in the laboratory. A slight amount of *Salmonella pullorum* infection was found when these chicks were a few days old. To date (July 25) 107 specimens have been examined in our laboratory.

The bacteriological examinations revealed no organism as being consistently present. *S. pullorum* was isolated only a few times and *Escherichia coli* frequently. A coccoid organism that grew only on special media was isolated now and then. Attempts were made to transmit the disease to healthy young laying hens by the use of organisms isolated from the affected birds and by tissue emulsions. It is now many weeks since these birds were exposed in various ways, but no signs of disease have developed. Table I shows the results of the pathological examinations of 86 adults.

It will be noticed from the table that roundworms were found in 50 per cent of these chickens. Tapeworms were found in 12.79 per cent of them. It must be remembered that the examinations were conducted during the part of the year when relatively few tapeworms are found. Two worm treatments had been given, one in the fall and one in the early part of Feburary. Following each treatment the owners reported the finding of large numbers of tapeworms and roundworms in the droppings of the treated chickens. We have reason to believe that both these farms are heavily contaminated with worm eggs, especially since the examination of chicks revealed heavy worm infestation at 2½ months of age. Chicks were brought to the laboratory for examination every two weeks from the time the chicks were one month of age. In fourteen 2½-month-old chicks we found roundworms in 6 (42.85 per cent), tapeworms in 3 (21.42 per cent), coccidia in 8 (57.14 per cent), and enteritis in 92.85 per cent).

An examination of seven three-month-old chicks showed roundworms in 2 (28.57 per cent), tapeworms in 2 (28.57 per cent), leucosis in 2 (28.57 per cent), enteritis in 3 (42.85 per cent), and flabby heart in 1 (14.28 per cent).

TABLE I—*Lesions found in 86 adult hens (pullets)*

ORGAN	CONDITIONS FOUND	BIRDS	
		NUMBER	%
Cloaca	Cankery masses	4	4.6
Eyes	Iritis	3	3.5
Gizzard	Soft	3	3.5
Heart	Flabby	14	16.4
	Myocardium cloudy or infiltrated	44	51.16
	Pericardium inflamed or thickened	22	25.58
	Petechiae	2	2.3
Intestines	Cell infiltration areas	12	13.8
	Inflammation (marked)	39	45.35*
	Prolapse (rectum-cloaca-oviduct) at time of examination	18	21.0
	Roundworms	43	50.00*
	Tapeworms	11	12.79
Liver	Fatty degeneration	25	29.06
	Hematomas	3	3.5
	Lesions suggesting B.W.D.	9	10.5
	Leucosis	5	5.8
	Petechiae	3	3.5
	Sarcoma	1	1.15
	White foci (minute)	4	4.6
Peritoneum	Eggs or egg material in peritoneal cavity	9	10.5
	Inflammation	8	9.2
Ovary	Functional	27	31.5
	Inactive	36	42.00
	Regressive	23	26.74
	Lesions suggesting B.W.D.	2	2.3
Oviduct	Eggs or egg material	9	10.5
	Inflammation	12	13.8

*Some birds showed enteritis and no worms and some had worms but had not developed a noticeable degree of enteritis.

SYMPTOMS

Every time a visit was made to these flocks some time was spent watching for symptoms. It was soon noticed that prolapse did not occur alone in sick-looking birds. In fact many birds affected with prolapse looked quite well. Frequent

defecation or attempts at defecation were noticed. Straining and evidence of chronic diarrhea were observed in a considerable number of the birds. Quite frequently birds would be seen to stop for a moment, strain and pass some droppings, usually of soft consistency, whereupon the bowel would protrude sometimes for only a moment and at other times for a longer period. At times a portion of the bowel 2 to 2— inches long would protrude. Injuries, congestion, swelling and necrosis took place when the bowel failed to be retracted. If another chicken happened to be near, it quite often would take a pick at the exposed bowel and if the injury was marked it usually resulted in the affected chicken being chased around until it became seriously injured, even eviscerated. Prolapse or "blow-outs" were reported to occur immediately following the laying of an egg. This we did not have occasion to see. Birds discovered in the early stages of prolapse and placed by themselves usually recovered if too much swelling, injury or hemorrhage had not taken place.

Cause

What may be the cause of this ailment? Heavy production is often suggested as a cause, but we could not ascribe any more than a contributory rôle to this factor, since this malady is very prevalent in many low-producing flocks and is absent in many very high-producing ones. In the egg-laying contest at Michigan State College, only two cases of prolapse have occurred and these were found in one pen. There have been over 1200 birds in this contest during the year and the production averages over 150 eggs per bird. These birds are also of the age when prolapse usually occurs, namely, in the first year of production. In another large flock where the average production exceeds 200 eggs per hen, prolapse is practically unknown. Inheritance also has been thought of as a cause, especially when breeding from pullets. This view is not supported by our observations.

Open nests have been accused of allowing hens to peck at each other while on the nests, thus causing injury to the vent. On one of the farms where this problem is now being studied, there is little chance of such a thing being the causative factor because sacks are hung over the nests, yet prolapse is exceedingly common.

Feed cannot be a cause unless there is something in modern poultry feeds that causes enteritis in peculiarly susceptible birds.

Keeping chickens closed up during the laying season is thought of by some poultrymen as a cause, largely because they notice an improvement when the birds are turned out on range. The difference here lies in the fact that the bird on the range has a greater chance of escaping injury of the prolapsed parts and consequently a greater number of birds will recover. The incidence of prolapse is undoubtedly as great on the range as it is in the house. It seems from our observations that certain flocks are particularly subject to this disease.

So far we have been discussing and evaluating the opinions of poultrymen. Now what have poultry pathologists to say on this subject?

Ward and Gallagher[1] state that prolapse of the oviduct is associated with difficulty in laying and that cannibalism is an important factor in the outcome of the case.

Kaupp[2] is of the opinion that it has to do with too high perches being used for heavy-laying hens, especially when the wings are clipped.

Reinhardt[3] gives the cause of prolapse of the rectum as being inflammatory stimuli such as chronic intestinal catarrh, severe continued diarrhea and injuries. He states that prolapse of the oviduct occurs simultaneously with prolapse of the cloaca. Large eggs, heavy production, inflammation in the cloaca or oviduct, constipation of the rectum with consequent straining are other causes. In this opinion Otte[4] and V. Heelsbergen[5] concur. Buckley and Bunyea[6] give inflammation, stricture, tumor formation in the posterior part of the egg-passage, and malformed or double-yolked eggs as causes of egg-bound and consequent prolapse. In pullets, eggs, larger than the incompletely developed oviduct can handle, are given as the main cause. They also mention cannibalism as an associated evil.

From our observations we have come to the conclusion that prolapse is a symptom of certain diseased conditions in the intestine and more rarely in the oviduct. Hens in their first year of production and especially White Leghorns are the chief sufferers. We agree with others that prolapse of the rectum and oviduct and eversion of the cloaca are usually associated. Intestinal inflammation with persistent diarrhea and straining appears to us to be the most likely cause of this trouble. Inflammation of the oviduct is usually of mild character and is limited to the posterior end, indicating that it may be of intestinal origin, the irritant being carried into the oviduct from the cloaca. Large

eggs, broken eggs, or other egg material, found in the oviduct, may also be contributing factors.

Leucosis was found to be common in these flocks and in a few instances thickening of the posterior part of the oviduct, due to cellular infiltration, was noticed. This might interfere with the passage of eggs. Diphtheritic or cankerous masses were found over the posterior part of the oviduct in some hens. This may be due to prolonged inflammation. A filling-up of the bursa of Fabricius might also lead to interference with the passage of eggs or droppings and would thus cause excessive straining and prolapse. This bursa is quite large in young birds and almost indistinguishable in older ones. An inflammation with consequent swelling of the duct which opens into the cloaca may cause a filling-up and enlargement of this bursa.

As a cause of the intestinal inflammation so frequently found in these birds, we feel that worms and coccidia play a very important part, and the reason for less prolapse occurring in older birds than in young ones may lie in acquired immunity and not merely in physical strength acquired with age.

In birds affected with chronic coccidiosis and worms flabbiness of the heart muscle is frequently observed. The muscle of the gizzard is also quite often soft. It is more difficult to ascertain the condition of the muscles of the oviduct and intestines, but it may be that they are affected as well. This flabby condition of muscles may be associated with toxic action of products incident to worms, coccidia or secondary microbial invaders, yes, even toxic substances resulting from the excessive breaking-down of the bird's own tissues, such as intestinal mucous membrane. Enteritis, with sloughing of portions of the mucous membrane, is not at all uncommon in chickens. The weakening influence of a heavy worm infestation at such an early age as 2½ months cannot easily be overlooked.

In one flock where this trouble is prevalent, the owner reported that prolapse occurred first in the birds that he kept on the home farm and that these birds were given liquid milk, whereas some birds kept across the road on another farm escaped the ailment until much later in the year. Since these did not get liquid milk he thought that milk had something to do with it. He became more sure of this after observing that prolapse began to show up fairly soon after starting to use liquid milk for these birds also. His idea may not be far from right, as we know that liquid milk attracts flies and that flies act as intermediary hosts for

tapeworms and may also carry roundworms. Both of his flocks were found to be heavily infested with both tapeworms and roundworms.

We have little definite information to offer concerning the cause or causes of prolapse in chickens. This paper was written in the hope that it might arouse some interest in this subject, which just now looks rather complicated and surely is very important to the poultryman. We trust that we have not left the impression that we consider worm infestation as the sole cause of this disease, but we do feel that a heavy worm infestation at least aggravates the trouble and in such cases steps should be taken to combat these parasites by treatment and preventive measures.

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Small Percentage of Drugs Detained in 1931

Officials of the federal Food and Drug Administration's eastern district examined 3,677 shipments of crude drugs, aggregating about 40,000,000 pounds, in the year which ended July 31, 1931, according to W. R. M. Wharton, chief of the district. The lots included some 250 varieties and were inspected for conditions which might preclude their entry into this country under the federal Food and Drugs Act. Two hundred eighteen shipments, amounting to 1,271,367 pounds, or three per cent of the total quantity of drugs examined, were detained for violation of the law. Figures for quantities of shipments and detentions do not include licorice root and castor seed, inasmuch as only a small quantity of these products is used for medicinal purposes. In the previous year, the district examined approximately 61,000,000 pounds of crude drugs, detaining about 5,500,000 pounds, or 9 per cent.

"The principal reasons for detentions," declares Mr. Wharton, "were moldiness, worminess, and low potency in some drugs; excessive foreign matter in chamomile; high content of yellow styles in saffron; excessive ash and low alkaloid in stramonium; and in sandalwood detentions were made because non-U. S. Pharmacopoeia varieties were substituted."

COMPARATIVE GERMICIDAL TESTS OF MERCUROCHROME AND TINCTURE OF IODIN*

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During the past few years considerable interest has been shown in the subject of antiseptics. New antiseptics for cuts and abrasions, the sterilizing mouth-washes, gargling fluids and tooth-pastes, the germ-destroying and body-deodorizing soaps, the agent for the hair which is sure to defeat scalp germs as well as restore long-lost locks, and finally the antiseptic-incorporated cigarette with its throat-soothing qualities, have all come in for their place in the lime-light.

The very nature of some of these products and the claims made for them are such as to fail to impress the informed individual. On the other hand, as a result of scientific endeavor of a high order by research workers of outstanding ability and reputation, several germicidal compounds have been developed and advocated for definite, reasonable purposes, and justly demand attention. Among such agents is a compound of mercury with dibrom-fluorescein, brought out by Young, White and Swartz[1] and designated "Mercurochrome—220 Soluble."

Mercurochrome has become widely known. Aside from its use in the treatment of septicemic conditions, diseases of the genito-urinary tract, and so forth, it has been widely advertised and employed as a substitute for tincture of iodin in the treatment of cuts, abrasions, and wounds of various types. It has also been extensively advocated as a replacement for tincture of iodin as a skin disinfectant preparatory to surgical procedures.

A germicidal agent which is equal to or more effective than tincture of iodin, and which lacks the "sting" and tissue-irritating effects of iodin, is sure to prove valuable and to become popular. Thus, with the advent of mercurochrome and reports of its efficiency and non-irritating action it looked as if an ideal germicidal agent had been developed. In the meantime, however, conflicting reports have appeared as to the actual efficiency of mercurochrome under certain conditions.

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Time will not permit of a review of the rather voluminous literature which has accumulated on the subject. Suffice it to say that the work and reports of Young and his associates,[2-4] Tinker and Sutton,[5,6] Colebrook and Hare,[7] Simmons,[8] Rodiguez,[9] Reddish and Drake,[10] Allen,[11] Wright,[12] Douglas, Avery and Pilcher,[13] and a host of others, reporting on laboratory or clinical observations with mercurochrome, reveal markedly conflicting results and leave one in doubt as to whether or not mercurochrome is as valuable a germicide as was originally supposed.

In veterinary practice a germicidal agent employed for the treatment of various types of tissue wounds and for the sterilization of the skin preparatory to surgical operations must, obviously, meet conditions far more trying than is the case in the practice of human medicine. Because of the conflicting reports on mercurochrome and, further, in view of the fact that with all of the literature on the subject there is but very little dealing with the subject from a veterinary standpoint, we undertook a comparative study of mercurochrome and tincture of iodin along lines which we thought would be of interest in veterinary medicine.

Skin Disinfection

Our first tests were carried out with a view to comparing the efficiency of mercurochrome (2 per cent aqueous solution) with tincture of iodin in sterilizing the skin of the horse. In this test we endeavored to simulate as nearly as possible the procedure that would ordinarily be followed in actual practice involving preparation of the skin for a surgical incision. Hence, the skin was not artificially infected, the test being carried out with the bacterial flora naturally present on the hide of the horse employed.

A rectangle 6 by 9 inches on the side of the horse was carefully dry-shaved. This space was then plotted out in 18 areas, each measuring 1½ by 2 inches. Six of these areas were painted with mercurochrome, six with tincture of iodin, and six left untreated as controls. The individual areas were selected in such a way that we had iodin- and mercurochrome-treated places and control areas at representative points throughout the shaved rectangle.

After the iodin or mercurochrome had acted for ten minutes in a particular area, the space was rubbed briskly with a sterile swab slightly moistened with sterile distilled water and the swab placed in a sterile test-tube. Similar swabbings were taken from the control areas. The swabs were taken to the laboratory and

each immediately used for the inoculation of a plain agar and a blood-agar plate. After incubation for 48 hours, the colonies on each plate were counted. The results are shown in table I.

TABLE I—*Results of first experiment (examination of swabbings)*

TREATMENT OF AREA	COLONIES
Iodin	82
Mercurochrome	1102
None (controls)	1849

The colonies present on these plates represented a comparatively large variety of organisms, including fungi. A culture of *Staphylococcus aureus*, subsequently inoculated on the plates made from the iodin- and mercurochrome-treated areas, readily grew, indicating that sufficient of the chemicals had not been brought over to inhibit growth.

A somewhat similar test was subsequently conducted in which scraping from the treated and control areas, rather than swabbings, were cultured. Five days previous to the test proper, the rectangular area on the horse's side was closely shaved, using soap and water. The area was then washed free of soap and the 5 days allowed to intervene in order to give the skin a chance to become infected with organisms naturally present in and about the stable. As in the preceding test, 6 spaces, each 1½ by 2 inches, were painted with a 2 per cent aqueous solution of mercurochrome, and 6 with tincture of iodin, while the remaining 6 areas served for our control tests.

After the iodin and mercurochrome had been permitted to act for 10 minutes on their respective areas, scrapings were taken with sterile razor-blades. A separate blade was used for each individual area. As the scrapings were taken, the razor-blades to which the tissue material readily adhered were dropped into sterile bottles, each containing 33 cc of sterile distilled water and 2 cc of sterile horse serum. Three such bottles were used, all of the blades containing scrapings from the mercurochrome-treated areas being placed in one bottle, those containing material from the iodin-treated areas placed in the second, while the third bottle received the blades with scrapings from the control areas.

The bottles were vigorously shaken in order to wash the tissue scrapings from the razor-blades. A sterile swab moistened with a drop of the suspension of scrapings from the mercurochrome-treated areas was then streaked across a blood-agar and a plain

agar plate. The same procedure was carried out with the suspensions of scrapings from the iodin-treated and control areas. After incubation for 48 hours, colony counts were made of the various plates with the results indicated in table II.

TABLE II—*Results of second experiment (examination of razor-blade scrapings)*

TREATMENT OF AREA	COLONIES
Iodin	14
Mercurochrome	117
None (controls)	208

METHOD FOR WASHING BACTERIA FREE OF ANTISEPTIC AGENTS

In spite of seemingly significant controls, the question of possible bacteriostatic action of carried-over antiseptic has occasionally been raised in connection with the reports of various investigators. We endeavored to overcome such possible criticism through the development of a special technic for washing bacteria subsequent to treatment with the germicidal agents.

The apparatus used for this washing process consists of a $2\frac{1}{2}''$ by $\frac{5}{8}''$ Berkefeld "W" filter inclosed in a glass mantle with a tight-fitting, rubber stopper. The outlet of the filter is coupled to a "Y" tube, a piece of rubber tubing running from one branch of the "Y" to a regular filtering flask, while the other branch is connected to a pressure bottle containing sterile distilled water. The rubber stopper in the top of the filter mantle contains two holes, one to admit the tube from a separatory funnel and the other a bent tube for vacuum connection. In our work the complete apparatus consisted of three such filtering units—one for the mercurochrome-treated preparations, one for the iodin-treated material and the third for the control preparations. After the apparatus is assembled it is sterilized by autoclaving. It is pictured in figure 1.

Each suspension of treated organisms is placed in its designated separatory funnel at the top of one of the filtering units. A suspension of untreated organisms goes in the separatory funnel of the control unit. After the germicides under test have been permitted to act for the desired period (in our tests 10 minutes), the initial suspensions are immediately diluted by adding sterile distilled water. The stop-cocks of the separatory funnels are then opened, allowing the fluid to run down around the filters. Then, through the application of vacuum, the diluted antiseptic is drawn off, leaving the bacteria clinging to the filter.

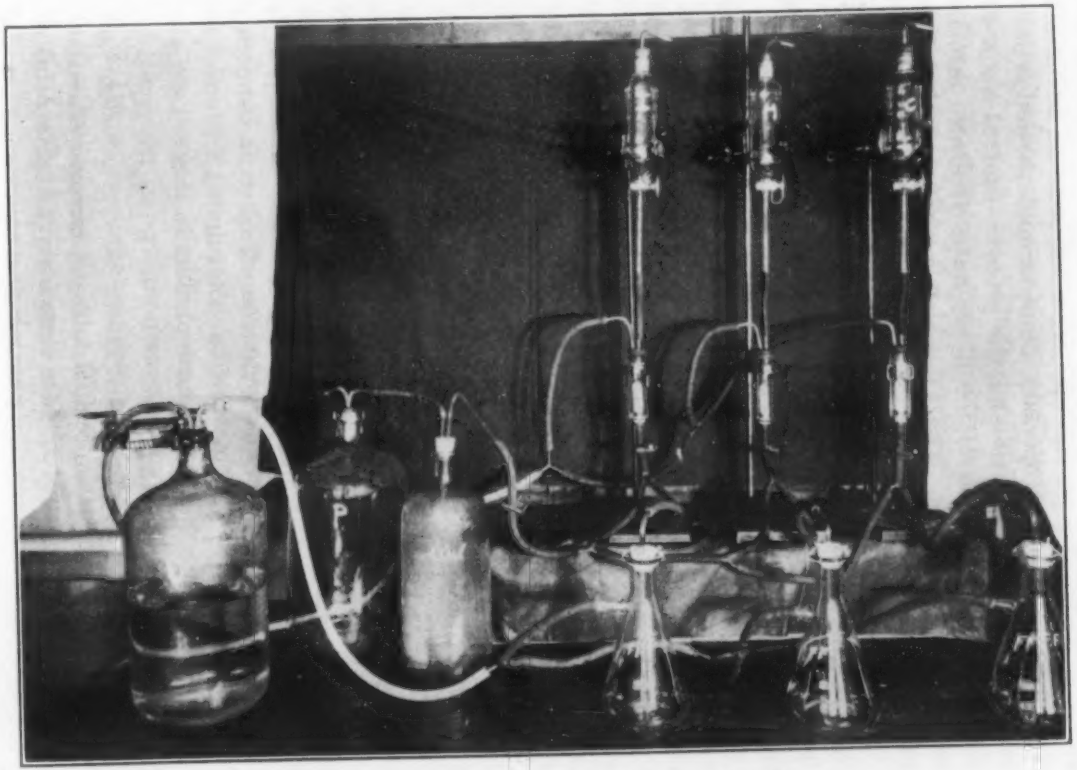

FIG. 1. Apparatus used for washing suspensions of bacteria.

The vacuum is now reversed and applied to the filter through the tube in the rubber stopper of the mantle. Through the use of a pinch-clamp the tube to the filter flask is closed and the previously closed clamp on the tube from the pressure bottle containing distilled water is opened. Thus, through the action of the vacuum within the mantle and the pressure exerted upon the water entering the stem of the filter, water is drawn into the mantle until it is filled. The vacuum is again reversed and the water drawn off.

This process of washing is repeated as often as desired. At the final washing each mantle is filled to within a short distance of the top and then well shaken to obtain an even suspension of the washed bacteria to be used in cultural tests.

Theoretically, with this apparatus no organisms should be lost in the washing process. However, some of the bacteria apparently remain in the superficial pores of the filter and are not readily freed in the final wash-water. Thus, while the method is not perfect, in that some organisms are lost, the procedure is far superior to centrifugalization methods.

Tests With Clostridium Tetani

It is a well known fact, of course, that *Clostridium tetani* is widely distributed in soil, especially that contaminated with animal excreta. Consequently the thickly hair-covered skin of the lower animal harbors the tetanus organism far more commonly than is the case with man. Thus, in the use of antiseptics for the treatment of tissue injuries and the disinfection of the skin preparatory to surgical procedures in veterinary practice, it is essential that the germicide selected be effective in rendering *Cl. tetani* impotent. With a view to determining the relative value of mercurochrome and tincture of iodin in this respect, the experiment described below was carried out.

A pure culture of *Cl. tetani* was grown on veal-infusion agar containing 1 per cent dextrose (pH 8.0). Anaerobic conditions were obtained through the use of a Brown jar. A suspension of the growth was made in sterile, physiological saline solution and this kept in the refrigerator several days in order that most of the organisms would be in the spore stage.

In each of three separatory funnels in a 3-unit filtering apparatus as described above, 5 cc of the suspension of tetanus spores was placed. To one 5-cc amount was added 0.5 cc of a 2 per cent aqueous solution of mercurochrome, to the second similar amount

of spore suspension was added 0.5 cc of tincture of iodin (U. S. P.), while the third 5-cc amount served for control purposes.

After the antiseptics had acted for 10 minutes, the suspensions containing same, together with the control suspension, were diluted immediately with 50 cc of sterile distilled water. The fluid was then drawn through the filter and the washing process started. Washing was continued until all traces of the antiseptic disappeared. After the last washing, the filter mantles were nearly filled with water and after placing sterile rubber stoppers in the mantles the suspensions were shaken vigorously.

A stained slide preparation from each suspension revealed hordes of tetanus spores.

A drop of each of the three suspensions plated on dextrose agar and placed in a Brown jar resulted, in 3 days, in a luxuriant growth of *Cl. tetani* from the mercurochrome-treated and the control suspensions of spores but no growth whatever occurred in the case of the iodin-treated suspension.

The plates which had been inoculated with the iodin-treated suspension were then streaked over with some of the untreated, original suspension of tetanus spores, and again incubated in the Brown jar. They were removed from the jar after 3 days, when examination revealed a luxuriant growth of *Cl. tetani*.

A repetition of the above-described test gave identical cultural results. However, in addition to making cultures of the treated suspensions we inoculated guinea pigs with the material.

Two guinea pigs each received an intramuscular injection of 1 cc of the mercurochrome-treated and washed spore suspension, two more received like amounts of the iodin-treated preparation, and another two 1 cc each of the control suspension. In inoculating the pigs a small amount of sterile emery flour was added to the spore suspensions for the purpose of facilitating infection if viable tetanus organisms were present.

The two guinea pigs inoculated with the control suspension both developed typical cases of tetanus and died as a result thereof. One of the two pigs injected with the mercurochrome-treated suspension developed tetanus and succumbed therefrom. The two pigs which received the iodin-treated spores both survived.

Miscellaneous Tests

After the development of our washing apparatus we carried out a number of miscellaneous tests with a view to obtaining

information on various questions which suggested themselves during our investigations.

The time allotted for this brief presentation will not permit us to go into all of these tests at the present time. However, data at hand indicate that while the commonly sold 2 per cent aqueous solution of mercurochrome has a germicidal effect on certain bacteria in watery suspensions, the chemical is far less effective in the presence of blood, serum, tissue exudates and other substances. The tincture of iodin proved distinctly superior under such circumstances.

A number of tests, comparing the value of 2 per cent aqueous solution of mercurochrome with tincture of iodin, were conducted with *Staph. aureus* (strain 209) as the test organism. In one of these tests 1 part of mercurochrome (2 per cent aqueous) was added to 9 parts of the culture of *Staph. aureus* in broth containing 10 per cent horse serum. Shortly after adding the mercurochrome, it was noted that a sticky precipitate had formed and when washing was attempted, the precipitate covered the filter candle as a heavy, glistening red film, and so clogged the filter that the washing could not be accomplished.

After 4½ hours, this sticky mass, by vigorous shaking, largely was dislodged from the filter candle into the fluid contained in the mantle. This suspension was then cultured in amounts of 1.00, 0.10 and 0.01 cc respectively. Hundreds of thousands of colonies of *Staph. aureus* developed on each plate. However, the plate into which the 1 cc of suspension had been inoculated contained a somewhat smaller number of colonies than the two other plates, due to the bacteriostatic action of the relatively large amount of dye contained in the first plate.

A parallel experiment conducted at the same time, with the same culture, but minus the horse serum, demonstrated the mercurochrome to be much more effective.

Tincture of iodin produces precipitates in various suspensions but in spite of the precipitate it proved germicidal in a large percentage of our tests.

Tests are now in progress in which we are employing the anthrax organism. This work will be included in our complete report, to be published later.

Conclusions

The evidence obtained in our investigations indicates that the commonly marketed 2 per cent solution of mercurochrome, 220

soluble, is not a satisfactory skin disinfectant for use in veterinary practice. Compared with tincture of iodin (U. S. P.), for such purpose, the latter proved distinctly superior.

A concentration of 1 part of tincture of iodin (U. S. P.) in 10 parts of a suspension of tetanus spores killed the spores within 10 minutes. A similar concentration of mercurochrome (2 per cent aqueous solution) failed in this respect.

Mercurochrome is decidedly ineffective as a germicide in the presence of blood, serum, tissue exudates, and possibly other protein substances. Such substances interfered much less with the bactericidal action of tincture of iodin.

The method described herein for washing antiseptic-treated bacteria should prove valuable in eliminating most of the antiseptic without losing a large percentage of the organisms. Thus, where this method is employed, there should be no question of bacteriostatic action from carried-over antiseptic in cultures of test preparations.

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[11]Allen, A. W.: Arch. Surg., xix (1929), p. 512.
[12]Wright, I. S.: Arch. Surg., xv (1927), p. 958.
[13]Douglas, Avery and Pilcher: Jour. Lab. & Clin. Med., xiv (1929), p. 822.

Swine Sanitation Increases Profits

An increase in gross returns, amounting to $45 per sow, is credited to the swine sanitation system by A. J. Long, an Indiana farmer, who compares his 1931 pig crop with his 1930 production. In 1930, under the old system of management, Mr. Long's 20 sows raised a fraction less than five pigs each. The pigs required eight months of feeding to fatten them to a market weight of 200 pounds. In 1931 the same sows, managed under the system of swine sanitation, raised 159 pigs, or an average of nearly eight pigs per sow. At the age of five months and twelve days, 32 of the 1931 pigs were marketed and averaged 201 pounds. This was not only an increased production per sow, but there was a saving of more than two months' feed in finishing the pigs for market.

Commenting on Mr. Long's experience, swine specialists of the U. S. Department of Agriculture point out that better feeding, housing, and other factors resulting from interest in the new system probably contributed to the results.

PROBLEMS OF TUBERCULOSIS CONTROL AND ITS RELATION TO SANITARY SCIENCE AND FOOD HYGIENE*

By PETER MALCOLM, *Des Moines, Iowa*

Chief, Division of Animal Industry, Iowa Department of Agriculture

The problem of tuberculosis control is of vital importance to the live stock industry, as agricultural prosperity is impossible unless the live stock is in a healthy condition. When the live stock industry of our country is crippled by disease, well-marked business depression is exhibited in all branches of industry. Therefore, it is very essential that our live stock industry be protected against tuberculosis.

With the knowledge that has been gained in the field and by research work both in the veterinary and medical professions in the past twelve years, there is no question but that tuberculosis is a serious animal disease, and, in addition to it being destructive to domestic animal life, it is communicable and frequently fatal to man.

In controlling and eradicating bovine tuberculosis, two fundamental principles must be considered: first, the making of an accurate diagnosis; second, the taking care of the reacting and non-reacting animals.

In making an accurate diagnosis several things must be taken into consideration, such as making the seat of injection aseptic. Also, if the intradermal test is used, great care should be taken to avoid going through the lower layers of the skin, for if this is done, the tissues may be injured to such an extent as to cause an enlargement which might be difficult to distinguish from a true tuberculin reaction. The cattle should be confined in a suitable place, so that the test can be properly applied.

Reactors should be separated from the non-reacting cattle and sent to slaughter immediately. No cattle should be added to herds of non-reacting cattle until they have been tuberculin-tested and found to be free from tuberculosis. All buildings and enclosures in which reactors are found should be cleaned and disinfected before non-reacting cattle are allowed to inhabit them.

*Presented at the sixty-eighth annual meeting of the American Veterinary Medical Association, Kansas City, Mo., August 25-28, 1931.

As to the efficiency of the tuberculin test, my personal opinion is that it is one hundred per cent perfect, when you eliminate the human mistakes that might enter into the manufacture of tuberculin and the application and reading of the test. In support of this assertion, the evidence that was introduced in the famous Mitchell County case, accepted and considered by the Iowa Supreme Court in trial of the case, is sufficient proof to warrant making this assertion, as the records show that in the process of tuberculin-testing the cattle to modify Mitchell County, there were 2,353 reactors found. Postmortem reports show that 10 per cent were condemned and tanked, and only 7 per cent showed no visible lesions.

In connection with this case the appellees contended "that the tuberculin test, in fact, is not a test." "Accuracy and dependability are lacking," they asserted. They stated, for instance, that well cows, according to the test, will indicate tuberculosis, while diseased cattle, when the test is applied, appear to be well. Much testimony concerning this proposition was introduced.

The Iowa Supreme Court, speaking through Justice J. Kindig, answers the above as follows: "However that may be, a careful reading of the evidence produced convinces us that the test is reliable, useful and advantageous."

Since it is recognized that certain tuberculous conditions frequently found in human beings can be attributed to direct or indirect transmission from animals, public health measures and animal disease prevention and control have become inseparable. Sanitary supervision covering the movement of live stock and the distribution of milk and meat products are logical problems for the consideration of sanitary officials and the public in general.

The general attitude in regard to public health has changed very much in the last half-century. The demand in our cities and towns has made sanitary reforms necessary. Pure food laws, meat and milk inspection ordinances, local inspection of meat markets, milk plants and dairies are all part of the general movement to obtain a wholesome food supply.

No laws or regulations will succeed in preventing and controlling tuberculosis of live stock unless sanitary inspectors and live stock owners are interested and sufficiently familiar with the fundamental principles of tuberculosis control to bring about the desired results. There is no use to make laws and establish ordinances or rules and regulations if they are not enforced, as no law is any more effective than its administration. Con-

sumers of meat and dairy products should be guaranteed that all meat and milk sold for human consumption be obtained from animals known to be free of any disease, and in particular tuberculosis.

This question, too, is covered by Justice Kindig, of the Iowa Supreme Court, when he states:

> We are constrained to hold that bovine tuberculosis is very generally recognized as injurious to cattle, hogs and poultry. Cattle, hogs and poultry are so associated with domestic use that the tubercular germ in live stock and poultry jeopardizes human beings. Transmissibility of the bovine type of tuberculosis to human beings is generally conceded by medical experts. Milk from tubercular cows contains the tubercular germ, and children and other users of milk become infected.
>
> Voluminous evidence upon this subject was taken pro and con in the case at bar. While there is a conflict, it appears certain from preponderance of the testimony that the bovine tubercular germ is an active and effective enemy of the human being. All people within the State are in danger. Consequently, the public interest generally demands that the destructive tubercular germ be controlled and eliminated.
>
> In providing measures for the protection of public health, the destruction or summary abatement of public nuisance inimical to the public health may be ordered. Unwholesome food may be destroyed, diseased cattle may be slaughtered. Because the Iowa bovine tuberculosis law is not unconstitutional, the judgment and decree of the district court should be and is hereby reversed.

So says Justice Kindig. Nevertheless, in face of the fact that five district judges and the Iowa Supreme Court ruled the Iowa bovine tuberculosis law to be constitutional, a small number of cattle-owners in Cedar County objected to having their cattle tested. They were stimulated by the invasion of propagandists, the main channel being the radio broadcasting station known as KTNT, which disseminated the American Medical Liberty League and Eugene Underhill propaganda.

This incited the cattle-owners to such an extent that when we attempted to test cattle on a farm in Cedar County we were met by an audience of one thousand to twelve hundred people. All of this number were not citizens of Cedar County, as there were people from different parts of the state of Iowa and a considerable number from Illinois. Neither were they all objectors to the test, as many came merely to see the fun. This latter statement is proven by the fact that when we met our first organized opposition in Cedar County, there were 695 herds out of a possible 2,441 herds that had never been tested. Since that time, 350 of these herds have been tested without the aid of the militia.

Some of the minor things that have entered into the work and which have caused us more or less trouble, and more or less criticism, which criticism in many cases was justifiable, could

have been avoided if our inspectors had used more diplomacy and taken the cattle-owner into his confidence by explaining to him the reason why the meat from some of the reactors is passed for food; why the carcasses of some are condemned and tanked and why some of the reactors show no visible lesions upon examination.

Some of our inspectors have not always borne in mind that the cattle-owner is the party particularly interested, not only that he bears a financial loss, when reactors are found in his herd but that he also shares the expense of the test by the taxes he pays. In counties where the inspectors have been tactful and have explained the law and the working of the test, and not shown too much authority, it has not been found necessary to go to the extreme in enforcing the law. In these cases the inspectors have had the fullest coöperation of the owners.

Confidence in the Tuberculin Test

The following editorial comment on the tuberculin test was made recently by Arthur H. Jenkins, editor of the *Farm Journal:*

> The farm "wars" and near-wars that have made their appearance in the newspapers in the last few weeks show once more that the farmer has not lost his capacity for direct and vigorous action, when sufficiently aroused.
>
> In Iowa, dairymen have been resisting the compulsory testing of their cattle for tuberculosis, and so serious has the situation become that some companies of state troops were called out to protect the veterinarians.
>
> That is only one more instance of farm disapproval of the tuberculin test, based sometimes on misunderstanding of the purpose of the test, sometimes on disbelief in its results, sometimes on lack of confidence in the testers and their methods. It is an old story in the dairy world, and while the test can be shown to have failed in innumerable instances, the general verdict is that bovine tuberculosis can be greatly reduced, if not entirely wiped out, by this system.

Another expression of confidence in the tuberculin test by one who has been in a position to observe.

American Scientific Congress Postponed

The Director General of the Pan American Union recently announced that word had been received from the Mexican government that owing to the fact that present world conditions make it impossible for many nations to send special representatives to the sessions of the Seventh American Scientific Congress, which was to have been held in Mexico City, February 5-19, 1932, it has been decided to postpone the said Congress until November, 1933.

PARAPLEGIA INDUCED BY OSTEOPOROSIS

By GREGORIO SAN AGUSTIN, *Los Banos, Laguna, P. I.*

College of Veterinary Science, University of the Philippines

History: This is to record a case of paraplegia in a cross-bred Arabian stallion which had been used for breeding purposes by the Department of Animal Husbandry, College of Agriculture of the University of the Philippines, for about seven years. The animal was a regular racing pony of fair performance in the Manila Jockey Club before it was acquired by the College. During the time it was under the care of the latter institution, an average body weight of 554 pounds was maintained. However, beginning January, 1931, up to the time when signs of the serious ailment were observed, the animal progressively decreased in weight.

On May 19, 1931, it was brought out of the stable to breed a mare, but although there was a complete erection of the penis, the animal was not able to mount, showing symptoms of weakness of the limbs. From that time on, the animal was more carefully attended to, in order to determine accurately the possible cause. To our surprise the animal developed characteristic symptoms of threatening paralysis of the hind quarters. It moved very cautiously with stiff gait, sometimes shifting its weight from one limb to the other, apparently showing pain in the joints. There was great difficulty of getting up and at last, on July 2, 1931, it preferred to maintain a recumbent position, unable to get up even with assistance. Attempts were made to sling it but of no avail, the hind quarters being completely paralyzed.

Symptoms: The following day, July 3, 1931, the clinical staff of the College of Veterinary Science was called upon to handle the case. The animal was found lying flat on the right side with decubital sores and contusions on the region of the external angles of the ilium and around the eyes; the facial expression was

sardonic, with nostrils dilated; the eyes were lustreless, with dilated pupils, and the visible mucous membranes were pale. The pulse was very rapid and weak; the respiration was shallow and of abdominal type; the temperature was not very much

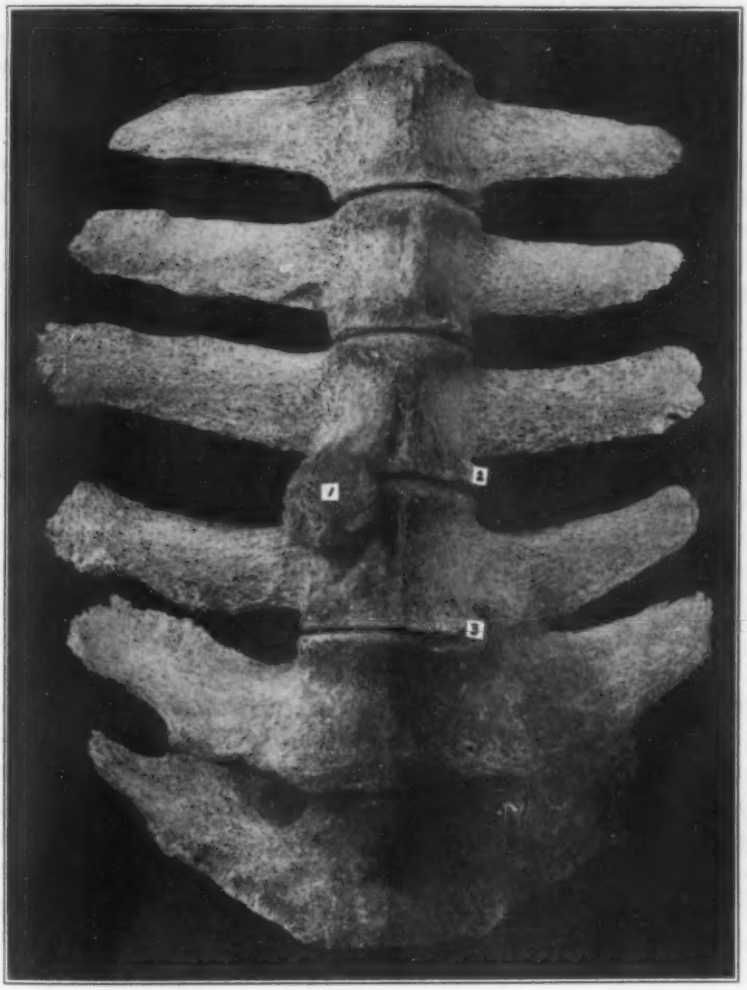

FIG. 1. Ventral view of macerated lumbar vertebrae showing exostoses. Note the constricted fifth intervertebral foramen on the left side.

increased, being 38.8° C. Torpidity of the bowels and urinary bladder was manifest, revealing fecal stasis and distended urinary bladder upon rectal examination. Different portions of the hind quarters and extremities were carefully palpated with

the object in view of determining the source of the affection. Upon pricking the various portions of the limb with a pin, the animal showed absolutely no sensation.

Diagnosis: Paraplegia with undetermined cause.

Treatment: Symptomatic treatment was instituted. The feces were removed and about 1000 cc of thick, albuminoid, and very turbid urine was withdrawn upon catheterization. The decubital sores were attended to. An injection of camphorated oil was given. Fomentation, followed by massage with white liniment, was applied on the lumbar and gluteal region at intervals of two hours. Doses of tincture of digitalis were administered per os to correct the heart action. However, despite our efforts to help the animal, death occurred on the night of the same day.

Anatomico-pathological findings: Early the following morning, July 4, 1931, a thorough postmortem examination was conducted. The following conditions were noted: (1) acute nephritis, (2) hemorrhagic cystitis, (3) apparent fatty degeneration of the heart, liver and kidneys, (4) ecchymoses of the heart wall, lungs, and mucous membrane of the urinary bladder, and (5) hard growths in the region of the ventral surfaces of the bodies of the third, fourth and fifth lumbar vertebrae, undercovered by the psoas muscles.

For purposes of further study, the entire skeleton of the animal in question was subjected to maceration and a typical picture of generalized osteoporosis was observed after the process. The hard growths referred to above proved to be typical exostoses found between the third and the fourth (1 and 2, fig. 1), and between the fourth and fifth lumbar vertebrae (3, fig. 1). Of those between the third and the fourth, the right one (1) was considerably larger than the rest. All of them practically obliterated the third and fourth intervertebral foramina on both sides. It may be mentioned in this connection that the fifth intervertebral foramen on the left side was abnormally narrow, due to the exostosis of the adjacent transverse processes.

Conclusions: From the postmortem findings, together with the lesions observed in the bones, especially those in the lumbar vertebrae, we were led to believe that this is a typical case of paraplegia brought about by osteoporosis. It should be borne in mind, however, that the immediate cause of death is traceable

to uremia and general debility. In all probability the nerves (ventral branches of the third, fourth and fifth, especially) which enter into the formation of the lumbo-sacral plexus, whose branches innervate the muscles of the posterior limbs, were paralyzed due to the pressure exerted upon them by the exostoses.

POSTERIOR PARALYSIS IN A LAMB DUE TO HEMORRHAGE IN THE SPINAL CORD

By L. P. Doyle, *Lafayette, Indiana*

Department of Veterinary Science, Purdue University Agricultural Experiment Station

A five-month-old purebred lamb, which previously had been apparently healthy, suddenly became paralyzed in the hind parts. The lamb was one of a flock of about thirty head. There was no other case of disease of any kind observed in the flock during at least four months preceding and three months following the case reported there.

The affected animal did not show any noticeable disturbance of appetite nor any other symptom in addition of the paraplegia. The paralytic condition remained unchanged during three days, then the lamb was killed for necropsy. The postmortem examination did not show any recognizable gross pathological condition of the visceral organs, skeleton, or skeletal muscles. The spinal cord, in the lumbar portion, showed several hemorrhages which were large enough to be seen easily on gross examination.

Microscopic examination of sections of the brain and spinal cord did not show any apparent change except the hemorrhages in the lumbar portion of the cord and consequent degenerative changes in some of the large nerve cells. The hemorrhages occurred in both the white and the gray matter of the cord. In the ventral horns of the gray matter, the hemorrhages occasionally completely surrounded the large nerve cells, and these cells showed well defined degenerative changes.

From the microscopic examination, it was not possible to determine the cause of the hemorrhages. Since the gross examination did not show evidence of trauma or other injury which may have caused concussion with consequent hemorrhage in the cord, the precise cause of the hemorrhages remained undetermined. There is a possibility, of course, that the cause may have been an infectious or a toxic agent of some kind.

UNUSUAL SARCOMA IN A CHICKEN

By J. F. WITTER, *East Lansing, Mich.*

Animal Pathology Department, Michigan State College

A live mature Barred Rock hen, sent to this Station for autopsy, had a history of gradual loss of weight and failure to lay. Her abdomen was filled with a hard mass, and her vent protruded somewhat as in prolapse of the anus.

Upon autopsy, the tumor (fig. 1) was removed from the abdominal cavity. It extended from the region of the liver as far back as the vent, and measured 11 cm. long and 6.5 cm. in diameter at its largest point. It was distinctly lobular and

FIG. 1. Sarcoma (slightly reduced). A, vent; B, lumen of large intestine.

divided into two parts, the posterior part being somewhat smaller and involving directly the cloaca, almost completely filling this organ, allowing passage-way about 1 cm. in diameter from colon to vent. The anterior part inclosed what appeared to be necrotic and partially decomposed remnants of egg-yolks. The posterior part had in its center a sanguineous, partially decomposed mass. The tumor had the appearance of sarcoma.

About midway in the intestinal tract were three tumor-like masses about 2 cm. long and 0.5 cm. wide, resembling sarcoma.

Sections of the tumor (figs. 2 and 3) show cells with spherical nuclei 6 to 7 microns in diameter, and deeply staining nuclear

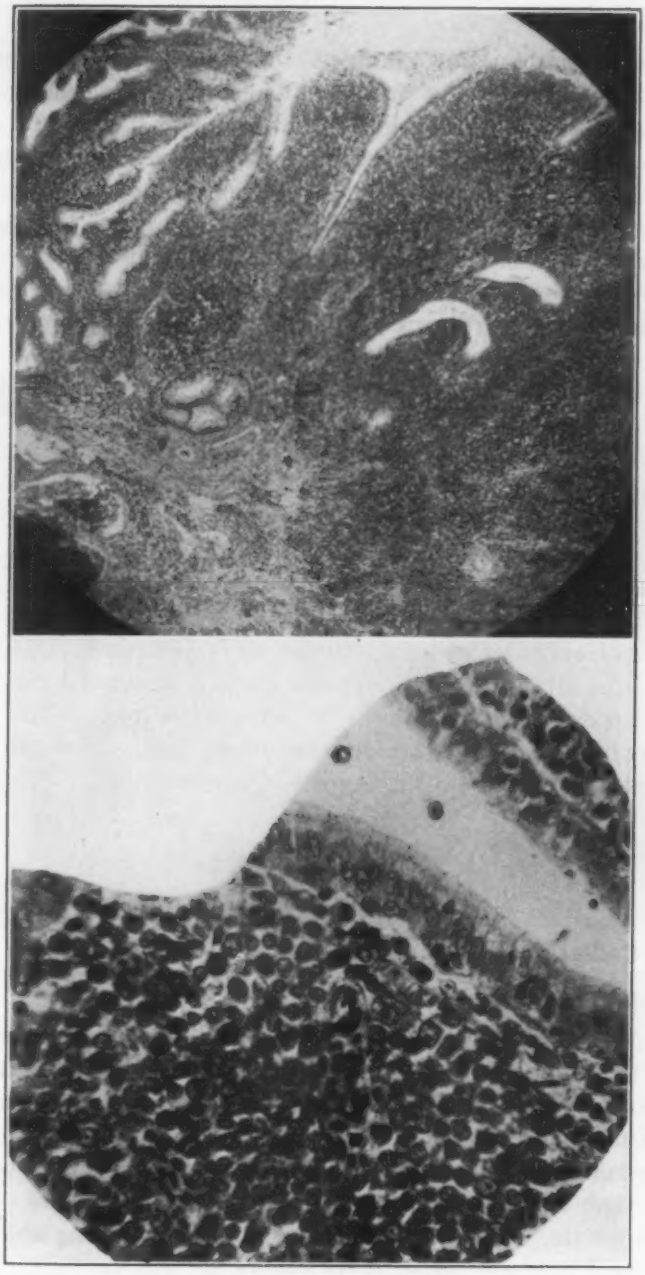

FIG. 2 (above). Cloacal portion of tumor (x 55).

FIG. 3 (below). Same as figure 21 (x 500).

membrane and nuclear granules. The cytoplasm is relatively scarce and indefinite in outline. The cells are closely packed and arranged somewhat regularly in strands.

Throughout the tumor are degenerative areas ranging from a few microns to more than a millimeter in diameter. Large areas of very vascular tissue, some of which show recent degenerative changes, are scattered along between the mucosa of the cloaca and the tumor, comprising the bulk of the central necrotic portion of the posterior part. The stroma and muscular layer of the cloaca are almost obliterated by the infiltration of sarcoma cells, as seen in the photomicrographs. The tumor is highly vascular throughout.

Sections from the intestinal growths show a profuse sarcomatous infiltration of stroma and submucosa, with similar infiltration of musuclar wall in less extensive areas. At the point of greatest enlargement, the muscular layer, submucosa, and stroma are completely replaced by sarcomatous tissue and the epithelium of the mucosa is limited to the surface layer. A section of another intestinal tumor shows extreme vascularization of the stroma, and these areas also are covered by a simple columnar epithelium with no villi and but few folds. The serous borders of these tumors are interrupted by highly vascular layers and areas showing varying degrees of degeneration.

LYMPHATIC LEUKEMIA

By LYLE GRAY, *Columbus, Ohio*

College of Veterinary Medicine, Ohio State University

Subject: A five-year-old Jersey cow.

History: This cow gave birth to a normal calf on August 19. Since that time she had been getting thin and had not been very active. On October 9, she was in heat and at that time the owner noticed a swelling above the posterior border of the base of the mammary glands, which was about the size of a walnut. Since that time she had been getting more emaciated, with a poor appetite, decrease in milk flow, and the swelling above the udder had been enlarging. On October 29, she was brought into the hospital.

Symptoms: The symptoms as described by the owner were noticed. At this time there was also noticed a very marked swelling of the superficial lymph-glands. These glandular en-

largements were cold and non-inflammatory. The left prescapular gland enlarged to the size of a large hen egg; the right precrural was about the size of a turkey egg. The other superficial glands were not so much enlarged.

A rectal examination revealed quite extensive enlargements in the sublumbar region. The animal was quite dyspneic and held the head extended. Accompanying the dyspnea there developed emphysematous areas, first along the point of the right elbow and over the right shoulder. These areas continued

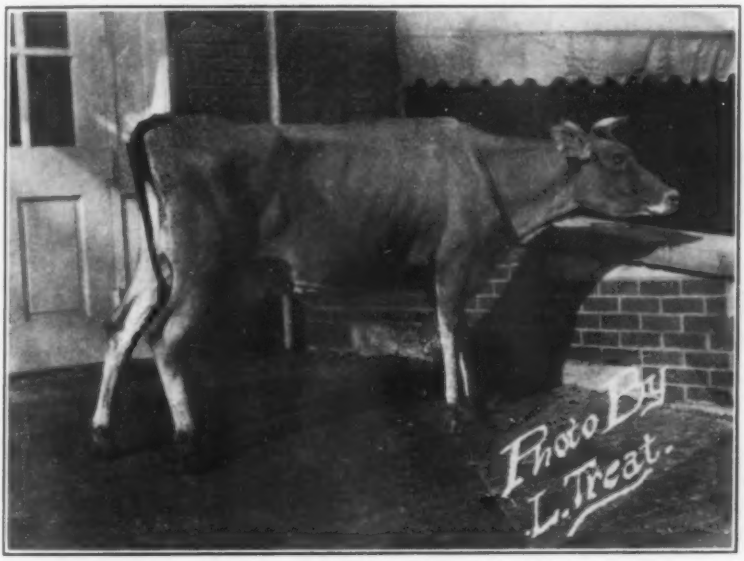

FIG. 1. Lymphatic leukemia

to spread and extended back along the vertebral spines to the paralumbar fossa and forward a considerable distance along the neck. Later these areas also extended to the left side.

The pulse was slightly accelerated. The temperature remained normal until the third day after entering the hospital, at which time it rose to 105.6° F., and remained high until her death on November 4.

Some blood was taken for examination and a blood count made. This count showed 11,000 white blood corpuscles per c.mm., 55 per cent of which were lymphocytes, 15 per cent monocytes; 26 per cent neutrophiles; and 4 per cent eosinophiles. The red blood corpuscles numbered 6,000,000 per c. mm.

A test for hemoglobin was made, using the hemoglobin scale. The reading was about fifty.

Postmortem findings: All of the lymph-glands were enlarged. The right superficial inguinal lymph-gland was about six times larger than normal and the left about three times larger than normal.

The deep inguinal lymph-glands were somewhat larger than a normal kidney. The lumbar glands also were greatly enlarged.

The spleen exhibited a slight change which was due largely to passive congestion.

Sections from these glands were stained and on examination the germinating areas were greatly enlarged and showed a great production of lymphocytes.

Catarrhal and purulent pneumonia; emphysema of lungs, and a fibrinous pleuritis.

Diagnosis: Lymphatic leukemia.

Acknowledgments: The author wishes to acknowledge the assistance of the Veterinary Faculty. The picture was taken by Mr. L. A. Treat, senior student.

TREATMENT FOR OESTRUS OVIS

By J. R. STEWART, *Sydney, Australia*

The article, "A New Treatment for Oestrus Ovis Larvae in the Head of Sheep," which appeared in the August, 1931, issue of the JOURNAL, was read with interest. We have been treating this disease for many years with no trouble or risks.

We use a 5-cc syringe-needle, one inch long, truncated, with a hard steel stilet inserted in the needle. The stilet has a flat head. Apply the needle and stilet to the desired spot, after restraining the sheep to be treated. With a sharp blow with a wooden mallet, drive the needle into the sinus, withdraw the stilet, attach the syringe to the needle, inject 2 cc of solution and withdraw the needle.

Site of operation: For rams with horns (Merino): one-fourth of an inch from the base of horn (one injection on each side). For ewes, wethers and rams without horns, inject into the frontal sinus near the median line, parallel to the supra-orbital process of the frontal bone (upper limit of the eye-socket). One injection should be made on each side of the median line. The method is quick, causes no trouble and is effective.

N-Butylidene Chloride, A New Drug for the Treatment of Equine Strongylosis. Willard H. Wright, H. B. Raffensperger, John Bozicevich, Paul C. Underwood and Jacob M. Schaffer. Jour. Agr. Res., xliii (1931), 4, p. 287.

N-butylidene chloride administered to four animals at a dose rate of 0.207 to 0.333 cc per kilogram of body weight and followed by 960 cc of raw linseed oil for a 1000-pound animal resulted in efficacies of 50, 94, 100 and 100 per cent, respectively, against *Strongylus* spp., and of 100 per cent for cylicostomes in all four animals. The anthelmintic removed all of the *Poteriostomum* spp. present in three animals that harbored these parasites. When administered in raw linseed oil, n-butylidene chloride was relatively ineffective for the removal of ascarids, but when given without oil the drug was apparently effective for the removal of this species. N-butylidene chloride administered to three animals weighing 800 to 1200 pounds, in doses of 60 cc in capsules, failed to destroy one *Habronema muscae* in one animal, was 55 per cent effective for this species in a second animal, and was 96 per cent effective for *H. microtoma* in a third animal. The drug was relatively ineffective against bots. The drug was well tolerated and produced no gross pathological lesions. Microscopically, apparently minor lesions were noted in the liver and kidneys.

Agglutinin, Complement, and Chemical Composition of the Colostrum of the Cow. M. Sato, K. Ogura and H. Ikejima. Jour. Dairy Sci., xiv (1931), 2, p. 156.

Agglutinins are found in the colostrum from 1 to 4 days following normal parturition. Agglutinins reacting with *B. coli* and *Vibrio fetus* are found to be most abundant, those reacting with *B. paratyphosum* B, *B. melitensis* and *B. abortus* coming next in the order named. In the colostrum obtained from a cow suffering from inflammation of the udder there seems to be no fixed

rule as to the appearance of agglutinins. In the milk secreted by a cow which aborted in the fourth month after pregnancy, the presence of agglutinins has not been proved. The presence of complement was not proved in fresh and normal colostrum. The specific gravity and total ash are fairly constant. There are wide fluctuations in the hydrogen-ion concentration, color, coagulation, per cent total protein and relative proportions of each, per cent lactose, and fat content.

THE TRANSMISSION OF FOWL-POX BY MOSQUITOES. Robert Matheson, E. L. Brunett and A. L. Brody. Poultry Sci., x (1931), 5, p. 211.

Nine positive transmissions of fowl-pox by mosquitoes (*Aedes vexans* Meigen) are recorded. In six experiments fowl-pox was transmitted 2, 3, 9, 16, 17 and 27 days after the mosquitoes had fed on fowl-pox comb lesions. In two experiments transmission occurred in 3 and 9 days after feeding mosquitoes on raisins contaminated with fowl-pox virus. Fowl-pox was produced by inoculating the comb with a suspension of crushed mosquitoes which had fed on raisins contaminated with fowl-pox virus 27 days previously. The first lesion developed eleven days after inoculation. In two experiments the same mosquitoes were used, producing inoculations 2 and 27 days after their infective meal.

THE DISTRIBUTION OF COCCIDIAL OOCYSTS ON A POULTRY FARM IN MARYLAND. Justin Andrews and H. Tsuchiya. Poultry Sci., x (1931), 6, p. 320.

Counts of oöcysts from various samples obtained on a poultry farm indicate that the oöcysts are most numerous under perches, brooding canopies, in and around drinking fountains, and around food-hoppers. Birds should be prevented from access to these sources of infection by installing suitable platforms of wire mesh to cover these heavily infested situations.

SOME PATHOLOGICAL CONDITIONS FOUND IN THE CECA OF FOWLS. Alex. D. Baker. Poultry Sci., x (1931), 5, p. 246.

The author describes nodular growths in the ceca of fowls the etiology of which is not clear. A study of a series of the growths conveys the impression that some irritant, acting on or in the cecal glands of the mucosa, gives rise to the initial thickening.

The author suggests that later infolding around this central region may occur until the larger open nodular formations have arisen. The initial cause is very probably parasitic or bacterial.

Avian Tuberculosis in Normal and Vaccinated Rabbits. E. M. Medlar. Amer. Jour. Path., vii (1931), 5, p. 475.

There is a significant difference in the gross pathology and in the histopathology of non-vaccinated and vaccinated rabbits intravenously injected with virulent avian tubercle bacilli. The text-book description of the tubercle—"a collection of epithelioid cells set in a reticulum with a giant-cell in the center and a tendency to undergo caseation"—represents a retrogressive, not a progressive, phase of the pathology of tuberculosis. There is a striking difference in the leukocytic reaction of the non-vaccinated and vaccinated rabbits intravenously infected with virulent avian tubercle bacilli. The leukocytic response in the vaccinated rabbit simulates very closely the leukocytic reaction observed in human beings who have progressive tuberculosis. The megakaryocyte plays an important rôle in acute avian tuberculosis in the rabbit, the real significance of which cannot be stated.

Tularemia in Norway. Th. Thjotta. Jour. Inf. Dis., xxix (1931), 2, p. 99.

The author deals with the distribution and modes of infection as observed in Norway. It has been found over practically the entire country. With the exception of the typhoidal type of the disease, all other types have been met. No deaths have been seen. Besides the hare, the lemming is a probable carrier. No case originating from the bite of an insect has been observed as yet.

Brucella Abortus of Bovine, Porcine and Equine Origin. Wayne N. Plastridge and James G. McAlpine. Jour. Inf. Dis., xlix (1931), 2, p. 127.

One hundred and thirty-six strains of *Br. abortus* of bovine, porcine and equine origin were identified by the dextrose utilization method of McAlpine and Slanetz and by Huddleson's dye-plate method. Eight of the sixty strains of bovine origin isolated in the United States were found to be of the porcine, and fifty-two of the bovine type. Of fifty strains of bovine origin isolated in Europe, forty-eight were found to be of the bovine type, while

two appeared to be intermediate types. All of the twenty-two strains of *Br. abortus* of porcine origin utilized appreciable amounts of dextrose and behaved as the porcine type on dye plates. Four strains of equine origin proved to be of the bovine type of *Br. abortus*.

THE SPECIFICITY OF AVIAN TUBERCULIN REACTIONS. Vera B. Dolgopol. Jour. Inf. Dis., xlix (1931), 3, p. 216.

A positive reaction to avian tuberculin, observed in many cases of pulmonary tuberculosis, does not indicate an active mixed infection with human and avian tubercle bacilli. This conclusion is based on the result of inoculation of chickens with the sputum of ten patients who showed positive reactions with avian tuberculin. A positive reaction to avian tuberculin in pulmonary tuberculosis does not indicate latent infection with avian tubercle bacillus. The author bases this conclusion on the result of inoculation of chickens with autopsy material, including peribronchial lymph-glands, from three patients who had shown positive reactions with avian tuberculin. The large percentage of positive reactions with avian tuberculin in tuberculous patients must be considered only as a large percentage of group reactions in patients suffering from tuberculosis caused by the mammalian types of tubercle bacilli. In the presence of positive cutaneous reactions with mammalian tuberculins a positive reaction with avian tuberculin cannot be taken as indicating an infection with the avian tubercle bacillus; but such infection may be assumed to exist when the reaction with avian tuberculin is positive while the reaction with other tuberculins is negative or considerably weaker. Tuberculosis does not develop in chickens when they have been inoculated intravenously or intraperitoneally with large amounts of mammalian tubercle bacilli.

EFFECT OF BACTERIOPHAGE ON EXPERIMENTAL ANTHRAX IN WHITE MICE. P. B. Cowles and W. M. Hale. Jour. Inf. Dis., xlix (1931), 3, p. 264.

The strain of anthrax used was quickly and permanently lysed by the bacteriophage in high dilutions. That no protection resulted from the administration of bacteriophage in several ways, and that even contact between organisms and bacteriophage before infection usually failed to inactivate all of the former, seems significant and may suggest the reasons for failure of

bacteriophage therapy in other diseases. Under such experimental conditions bacteriophage does not seem able to act efficiently, if at all, in the tissues. It was present, however, and could be recovered even after death, although it cannot be stated that the principle recovered was some of the original material injected. The use of bacteriophage as an antigen failed to show any immunizing value against anthrax in mice, guinea pigs and rabbits.

Species Differentiation of the Coccidia of the Domestic Rabbit Based on a Study of the Oocysts. John F. Kessel and Harry A. Jankiewicz. Amer. Jour. Hyg., xiv (1931), 2, p. 304.

Studies of the oöcyst stages of the Eimeria of the domestic rabbit have resulted in differentiating five species: *E. stiedae* (limited to the liver); *E. perforans* and *E. magna* (limited to the intestines); *E. media* and *E. irresidua* (species novo-limited to the intestines). Differential diagnosis in the living rabbit between liver and intestinal infections of coccidia is now possible by microscopic examination of the feces. Animal transfer experiments, in which chicks and guinea pigs were fed the oöcysts of the Eimeria of domestic rabbits, were attempted with negative results. Rabbits which harbor light infections show no regular periodicity in the appearance of the oöcysts in the feces. Oöcyst abnormalities in sporulation that rarely occur naturally may be induced by high temperatures. Does and their litters in rabbitries in which isolation and feeding conditions are uncontrolled do not always show the presence of the same species of coccidia. This indicates that infection through outside sources by flies or through the food is of common occurrence.

Spontaneous and Experimental Infection of Pigeons with B. Aertrycke. J. R. Cash and C. A. Doan. Amer. Jour. Path., vii (1931), 4, p. 373.

The apparently spontaneous development of a fatal disease in undernourished pigeons is reported, which is characterized by anemia, marked myeloid hyperplasia of the bone-marrow, striking increase in the myeloid elements of the blood, and extensive infiltration of the liver and kidneys with myeloid tissue. In addition to these myeloid changes, large nodular, often necrotic masses of mononuclear phagocytic cells are frequently found

scattered throughout the liver, spleen, kidneys and bone-marrow. *B. aertrycke* was recovered in pure culture from the blood, liver, kidney, spleen and bone-marrow of these cases. In sections bacteria are found to be present in the foci of mononuclear cells, but do not occur within the collections of myelocytes. The disease has been produced experimentally in normal pigeons by the intraperitoneal injection of liver emulsions made from naturally infected birds, intraperitoneal injections of *B. aertrycke* derived from the same source, and also by oral administration of single large doses of broth cultures of this organism. Bacteria-free filtrates of broth cultures of *B. aertrycke* have had no demonstrable effect upon normal pigeons when injected or administered orally in single large doses.

An Experimental Study of "Mad Itch" with Special Reference to Its Relationship to Pseudorabies. Richard E. Shope. Jour. Exp. Med., liv (1931), 2, p. 223.

The clinical picture and gross pathology of spontaneous and experimental "mad itch" are described and the inciting agent shown to be a filtrable virus. The author was able to prepare a virucidal serum capable of neutralizing the virus. Fatal infections are regularly produced in rabbits when the virus is administered subcutaneously, intracerebrally, intravenously, intratesticularly, intraperitoneally, intranasally, or when it is dropped on a scarified area of skin. Its infectivity for other species by various routes is reported upon. The rabbit, guinea pig, white rat, white mouse, gray field mouse, cow, cat, duck, chicken and hog are susceptible to experimental infection. The disease is not contagious under laboratory conditions and the virus is restricted in the animal body largely to the region of inoculation and the lungs. The virus can be stored for relatively long periods in 50 per cent glycerol or in the dried state. A comparison of "mad itch" with pseudorabies leads to the tentative conclusion that the inciting agents of both are the same, although the strains of the two viruses that were under study possessed readily demonstrable differences.

No Veterinary Co-Eds at Ohio

Considerable newspaper publicity recently was given to the fact that there are no female veterinary students at Ohio State University, although co-eds are studying almost everything else.

APPROVED LABORATORY TECHNIC. John A. Kolmer, M. D., Dr. P. H., D. Sc., LL.D., Professor of Pathology and Bacteriology, Graduate School of Medicine, University of Pennsylvania; Professor of Immunology and Chemotherapy, School of Medicine, Temple University, etc., and Fred Boerner, V. M. D., Associate Professor of Bacteriology, School of Medicine, University of Pennsylvania. 663 pp. 300 figures and 11 full-page plates in color. D. Appleton and Company, New York, 1931. Cloth $7.50.

This book of 663 pages, written by Doctors Kolmer and Boerner and prepared under the auspices of the American Society of Clinical Pathologists, is a comprehensive and complete description of laboratory methods. It is of particular interest to veterinarians because it is written by Dr. John A. Kolmer, an honorary member of the American Veterinary Medical Association, and Dr. Fred Boerner, a member of that Association. It contains many laboratory methods used by veterinarians as well as many methods that may be applicable to veterinary laboratory work.

Quoting from the preface, the following is found:

> It is hoped that this manual will aid in the fulfillment of several of the objects of the American Society of Clinical Pathologists, namely, to establish standards for the performance of various laboratory examinations, to promote the practice of scientific medicine by a wider application of clinical laboratory methods to the diagnosis of disease and to encourage a closer coöperation between the practitioner and the clinical pathologist. And since there is a growing and gratifying increase in the use of laboratory methods by practicing veterinarians in the diagnosis of diseases of the lower animals, an effort has been made to render the manual of equal service to them.

The contents comprise five sections:

Section 1. General laboratory methods. Includes the use and care of the microscope, methods of housing, feeding, inoculating, bleeding and autopsying animals, together with suggestions for routine and special laboratory examinations.

Section 2. Clinical pathological methods. Includes methods of examination of the blood and urine particularly applicable to animals in veterinary laboratory work as well as the examination of secretions, excretions, exudates, transudates and functional tests.

Section 3. Bacteriological methods. Includes methods for the collecting and handling of material for bacteriological examination, preparation and sterilization of glassware, preparation of culture media, general bacteriological methods, diagnostic bacteriological methods, preparation of bacterial vaccines, milk and water examinations. The diagnostic bacteriological methods include such diseases as pus infections, anthrax, tetanus, malignant edema, tuberculosis, tularemia, glanders, hemorrhagic septicemia, fowl cholera, undulant fever, actinomycosis and various parasitic diseases.

Section 4. Serological methods. Includes methods for the collection of blood and serum, methods for conducting agglutination and complement-fixation tests, including undulant fever of man and abortion disease of lower animals, tularemia, glanders, bacillary white diarrhea, fowl typhoid.

Section 5. Clinical methods. Includes preparation of standard solutions, chemical examination of the blood and urine, milk and other foods, toxicological examinations and methods for the microscopic examination of tissues.

Thus many methods applicable directly to veterinary laboratory work are found, as well as many methods that are of much interest and later may be usable.

The publication and use of this book must draw closer and closer the medical and veterinary professions. It contains many methods of interest to both, as well as calling attention of the members of the medical profession to many veterinary problems and making members of the veterinary profession more familiar with many medical problems. The book shows very plainly the interrelationship of the physician and the veterinarian.

Written by Doctors Kolmer and Boerner, the one a physician and great scientist of medicine, with a deep understanding of the veterinary profession, the other a veterinarian engaged in post-graduate medical laboratory instructional work, the book is definite evidence of the mutual interest of the physician and veterinarian.

E. L. S.

Regular Army

The promotion of Captain George J. Rife, to the grade of major, to rank from November 27, 1931, is announced.

The retirement of Colonel Eugene J. Cramer from active service on November 30, 1931, is announced.

Veterinary Reserve Corps

New Acceptances

McKitterick, James Alex...	Capt....	Greenwood, Mo.
Bolender, Fred Jourette...	1st Lt...	817 Vanderbilt Pl., San Diego, Calif.
Ricks, Daniel Hollie.....	1st Lt...	Pauls Valley, Okla.
Boyce, Robert Arthur, Jr..	2nd Lt...	3337 Spring Garden St., Phila., Pa.
Griffith, Aaron Rufus.....	2nd Lt...	176 Broadway, Asheville, N. C.
Kendall, Gordon Charles..	2nd Lt...	94 Jenness St., Springfield, Mass.

Promotions

Lash, Elmer.....	Major...	2112 F St., N. W., Washington, D. C.
Patton, John Wesley.....	Capt....	638 Sunset Lane, East Lansing, Mich.
Nichols, Jeptha Harold....	1st Lt...	540 Prairie St., Paris, Ill.

"Embalmed" Cream Seized

Federal seizure, on November 25, of 143 gallons of "embalmed" cream prevented the sale of a product which might have proved dangerous to the health of consumers in three Florida towns, according to the federal Food and Drug Administration. The cream, which had been adulterated with formaldehyde, was shipped from Eatonton, Georgia, to consignees in St. Petersburg, Tampa, and Hialeah, Florida. Examination proved it to contain added formaldehyde and interstate shipment of the product was further illegal in that the cans were labeled with the word, "cream," this constituting misbranding under the federal Food and Drugs Act.

This cream was adulterated, under the law, because it contained an added poisonous or deleterious ingredient, formaldehyde, which might have rendered the product harmful to health. Furthermore, it was misbranded in that the designation, "cream" is false and misleading as applied to cream containing an added ingredient, formaldehyde, and would thus deceive and mislead the purchaser.

MISCELLANEOUS

Eastern Boy Scout Wins Chappel Award

Laurence Orne, 13 years old, of Melrose Highlands, Mass., and his Eskimo sled dog, "Paugus," were declared winners in the Chappel Kennel Foundation's competition for "America's most typical boy and dog." Announcement of the winner's name in the nation-wide competition was made before President Hoover, on December 17, and he was the first person to congratulate young Orne.

America's Most Typical Boy and Dog

Chief Scout Executive James E. West, of the Boy Scouts of America; Health Commissioner Herman N. Bundesen, of Chicago; Senator James J. Davis, of Pennsylvania, and Angelo Patri, noted educator, chose the winner from more than 6000 entries. Laurence and his dog will have their portraits painted by a famous artist, as a perpetual memorial to the tie that binds a boy and his dog. A cash honorarium of $250 was given to the boy on Christmas Eve at a radio Boy-Dog Party, broadcast over a national network.

Young Orne is a typical American boy and a "regular fellow," devoted to his canine pal. He is a Boy Scout and has won several prizes building model airplanes. His parents are Mr. and Mrs. Harold I. Orne, 26 Harrison St., Melrose Highlands. Paugus, the dog, is a noble lord of his race, with the blood of heroes in his veins. He is a grandson of Chinook, famed lead dog in the Byrd Antarctic expedition. As Chinook was a great-grandson of the lead dog on Peary's sled that reached the "top of the world" in 1909, Paugus' ancestors have helped in the discovery of both poles.

Airplane Used in Fluke Control

The aviator and the scientist again have joined forces against a dangerous enemy—this time the liver fluke, a parasite that three years ago threatened to put an end to sheep-raising in the Sierra Valleys of California.

As a result of the modern applications of science, an agricultural drama, played by the liver fluke, the snail which harbors the fluke in one stage of its life, a group of research workers and aviators, has a happy ending instead of turning into a tragedy for the sheep industry of the West.

As soon as the presence, in alarming numbers, of the liver fluke in California pastures was reported to the U. S. Department of Agriculture in 1928, an intensive campaign to save the infested sheep and eradicate the pest was begun by the Bureau of Animal Industry, with the coöperation of the California authorities and the California Wool Growers' Association.

Veterinarians assigned to the task found that carbon tetrachlorid, in proper doses, kills liver flukes in sheep and at the same time is harmless to the animals. The successful administration of about 300,000 doses of this chemical to California sheep in 1928 removed the liver fluke from the class of uncontrollable lives tock pests.

The next problem was to stamp out the flukes on lands which, under water all the first part of the year, provide the only palatable pasturage late in the season. These marshy places are ideal for the development of the thousands of eggs produced by the parasites in the sheep and passed out onto the grass. On dry land these eggs do not hatch, but in water they do, giving rise to larvae that swim energetically about seeking a suitable host. On the meadows in question a great array of

snails proved the perfect hosts, safely sheltering the larvae until the tiny flukes emerged to form cysts in the surrounding water or on the vegetation. Taken up by the sheep, with its feed or water, the young encysted flukes go to the animal's liver, where they reach maturity and deposit their eggs, starting the life cycle all over again.

When the snail's part in the story had been established, various methods of applying copper sulfate, fatal even in very small quantities to the snails, were tested. No effective means of scattering this dust over all the snail-infested area was devised, however, until an airplane pilot came forward to offer his services. Then copper sulfate was broadcast, at comparatively small expense, over the wet lush pastures, killing the snails and making the pastures safe for California flocks.

Illinois Veterinarians at Kansas City

Illinois veterinarians turned out in force. The final check-up revealed thirty-eight registered: Drs. Arthur C. Bolle, Petersburg; Guy Bradham, Cisne; Edward A. Cahill, D. M. Campbell, R. F. Eagle, John J. Hayes, E. C. Khuen, L. A. Merillat, A. A. Swaim and E. E. Swebe; Chicago; J. F. Callison, Moweaqua; A. E. Campbell, Rantoul; J. H. Crawford, Hinckley; A. H. Davison and Frank Thorp, Urbana; D. A. Eastman, Moline; T. J. Foster, Monticello; E. K. Glover and W. C. Mitchell, Galesburg; C. E. Hammond, Girard; W. B. Holmes, Springfield; Logan B. Huff, Aurora; A. J. Knilans, Freeport; J. V. Lacroix, Evanston; C. W. Lantis, Coatsburg; C. W. McLaughlin, Bloomington; N. S. Mayo, Highland Park; L. N. Morin, McLean; R. C. Riegel, Harrisburg; Robert Rives, C. B. Simmons and L. C. Stewart, East Saint Louis; B. J. Timmerman, Carlyle; F. O. Whiteman and L. B. Woods, Carrollton; B. E. Wise, Greenville; H. S. Wooters, Champaign; and F. C. Yabsley, Cissna Park.

Tularemia in Michigan

Seven cases of tularemia have been reported in Michigan the past year. These cases have been widely scattered, but it is believed that Michigan rabbits are infected with the tularemia organism and may have been responsible for some of the cases.

Somebody has estimated that at least one-tenth of the annual hay crop harvested in the United States, valued at approximately $1,300,000,000, is destroyed by fire, the result of spontaneous combustion.

AMERICAN VETERINARY MEDICAL ASSOCIATION

Resume of Minutes of Special Meeting of the Executive Board, Chicago, Ill., December 2, 1931

A special meeting of the Executive Board of the American Veterinary Medical Association was held at the Hotel La Salle, Chicago, Ill., Wednesday evening, December 2, 1931.

The following were in attendance: Dr. R. S. MacKellar, Chairman and Member-at-Large; Dr. George Hilton, District 1; Dr. E. P. Althouse, District 2; Dr. L. A. Merillat, District 3; Dr. C. A. Cary, District 4; Dr. C. P. Fitch, District 5; Dr. L. M. Hurt, District 6; Dr. C. H. Hays, District 7; Dr. N. F. Williams, District 8; Dr. D. H. Udall, District 9; Dr. O. V. Brumley, District 10; Dr. R. R. Dykstra, President; Dr. M. Jacob, Treasurer; and Dr. H. Preston Hoskins, Secretary-Editor.

The minutes of the three meetings of the Executive Board held at Kansas City were read and approved.

Dr. N. S. Mayo appeared before the Board to request the creation of a Section on Military Medicine. After thoroughly considering the matter, the Board decided to create a Section on Military Medicine, for two years.

The next item of business was to fix the time and duration of the 1932 meeting, in Atlanta. On recommendation of the Committee on Local Arrangements, the following dates were decided upon: August 23-24-25-26, 1932. Official headquarters will be at the Atlanta Biltmore Hotel.

The Board voted to support the National Live Stock Loss Prevention Board, to the extent of appropriating $100.00 per year for three years.

The applications of three veterinarians who were graduates of colleges not recognized by the A. V. M. A. at the time of their graduation were presented to the Board and approved. Several other applications were then considered. These had been held up pending investigation of the applicants.

Treasurer Jacob presented a list of securities recommended for the investment of surplus funds of the A. V. M. A. After a very careful consideration of the matter, it was decided to purchase government bonds to an amount deemed advisable by Treasurer Jacob, and the latter was so instructed.

Dr. T. E. Munce, chairman of the Committee on Affiliation of State and Provincial Associations with the A. V. M. A., appeared

before the Board and presented a report, supplementing the one made by the Committee at the Kansas City meeting. A motion prevailed to limit affiliation with the A. V. M. A. to the states, provinces and territories on the American Continent having active veterinary organizations. A motion prevailed making thirty associations as the number necessary for putting the plan of affiliation into effect.

The report of the Special Committee on Agricultural Extension Service, presented at the Kansas City meeting, was then considered by the Board. This report had not been published, for the reason that certain members had registered objections against certain statements in the report bearing on the veterinary situation in Illinois. After due consideration, a motion prevailed authorizing the Secretary to publish a summary of the report.

The next item of business was the report made at Kansas City by the committee appointed to study the recommendations contained in the presidential address of Dr. Hall. In the discussion which followed, it was pointed out that a number of the recommendations in the address really should go to the Committee on Policy. After considering the matter further, it was decided to have President Dykstra appoint a special committee to study the recommendations and report back to the Executive Board.

The Secretary then read letters which had been received, containing charges against a number of members of the A. V. M. A., for violations of the Code of Ethics. It was decided to investigate each case on its individual merits, and the Secretary was given instructions for proceeding in the matter.

Dr. MacKellar then read a letter from Mr. Sydney H. Coleman, president of the American Humane Association, containing a resolution bearing on legislation relating to ear-cropping. This resolution will be referred to the Association for action, at the Atlanta meeting.

Dr. Merillat then briefly outlined the plans which had thus far been made in connection with moving the A. V. M. A. office from Detroit to Chicago.

A number of routine matters concluded the business to come before the meeting.

H. PRESTON HOSKINS, *Secretary.*

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1931-1932

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W. L. Curtis, 1264 W. Second St., Los Angeles, Calif.
C. P. Fitch, University Farm, Saint Paul, Minn.
Reuben Hilty, 624 Huron St., Toledo, Ohio.
H. W. Jakeman, 44 Bromfield St., Boston, Mass.
William Moore, N. C. Department of Agriculture, Raleigh, N. C.
W. F. Crewe, Box 532, Bismarck, N. Dak.
C. J. Scott, Knoxville, Iowa.

Special Committee on Commercial Slaughter-Houses

J. S. Jenison, *Chairman*, 23 Federal Bldg., Kansas City, Kans.
W. T. Spencer, 1250 N. 37th St., Lincoln, Nebr.
George H. Glover, Fort Collins, Colo.
J. H. Spence, 551 9th Ave. S., Clinton, Iowa.
R. P. Marsteller, College Station, Texas.

Special Committee on Program

(To study recommendations contained in presidential address of Dr. Hall)

T. H. Ferguson, *Chairman*, 421 Broad St., Lake Geneva, Wis.
H. Preston Hoskins, *Secretary*, 537 Book Bldg., Detroit, Mich.
A. E. Behnke, 308 Federal Bldg., Milwaukee, Wis.
Walter Wisnicky, Dept. of Agriculture and Markets, Madison, Wis.
F. B. Hadley, University of Wisconsin, Madison, Wis.

Representative to National Poultry Sanitation Commission

N. S. Mayo, 484 Sheridan Place, Highland Park, Ill.

Representative to National Research Council

Chas. Murray, Iowa State College, Ames, Iowa.

Representative on Board of Managers, Horse Association of America

T. A. Sigler, Greencastle, Ind.

Representative to the American Association for the Advancement of Science

Ward Giltner, Box 955, East Lansing, Mich.

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Arizona.....J. C. McGrath, 1115 E. Van Buren St., Phoenix.
Arkansas.....J. H. Bux, Old State House, Little Rock.
California.....J. A. Howarth, University Farm, Davis.

Colorado.....Floyd Cross, 711 Mathews, Fort Collins.
Connecticut.....Edwin Laitinen, 993 N. Main St., West Hartford.
Delaware.....C. C. Palmer, University of Delaware, Newark.
Dist. of Columbia..H. E. Moskey, Food & Drug Administration, Dept. of Agri., Washington.
Florida.....J. V. Knapp, The Capitol, Tallahassee.
Georgia.....E. D. King, Jr., Valdosta.
Idaho.....A. J. Dickman, Boise.
Illinois.....Frank Thorp, Jr., University of Illinois, Urbana.
Indiana.....John F. Bullard, Purdue University, Lafayette.
Iowa.....John B. Bryant, Mount Vernon.
Kansas.....C. H. Kitselman, Kansas State College, Manhattan.
Kentucky.....R. L. Pontius, 1118 Slashes Rd., Lexington.
Louisiana.....F. J. Douglass, Station F, R. F. D. 6, Box 432 A, New Orleans.
Maine.....M. E. Maddocks, 7 School St., Augusta.
Maryland.....E. M. Pickens, College Park.
Massachusetts.....H. W. Jakeman, 44 Bromfield St., Boston.
Michigan.....B. J. Killham, Michigan State College, East Lansing.
Minnesota.....D. B. Palmer, Wayzata.
Mississippi.....Robt. H. Stewart, c/o Hinds County Health Dept., Jackson.
Missouri.....J. D. Ray, 1103 E. 47th St., Kansas City.
Montana.....E. A. Tunnicliff, Montana Agri. Exp. Station, Bozeman.
Nebraska.....D. W. Hurst, Tecumseh.
Nevada.....Edward Records, University of Nevada, Reno
New Hampshire....R. W. Smith, 161 Court St., Laconia.
New Jersey.....J. G. Hardenbergh, c/o Walker-Gordon Lab. Co., Plainsboro.
New Mexico.....F. H. Barr, 112 S. Broadway, Albuquerque.
New York.....C. E. Hayden, New York State Veterinary College, Ithaca.
North Carolina.....William Moore, N. C. Dept. of Agri., Raleigh.
North Dakota.....R. W. Bernhardt, Enderlin.
Ohio.....W. F. Guard, Ohio State University, Columbus.
Oklahoma.....C. C. Hisel, 209 W. 20th St., Oklahoma City.
Oregon.....W. H. Lytle, State Office Bldg., Salem.
Pennsylvania.....B. Scott Fritz, Strasburg.
Rhode Island.....J. S. Barber, 14 Washington St., Central Falls.
South Carolina.....Frank E. Kitchen, Greenville.
South Dakota.....M. W. Ray, Dwane Apt. 2, Sioux Falls.
Tennessee.....J. H. Gillmann, Box 2321, DeSoto Station, Memphis.
Texas.....H. O. Von Rosenberg, Hallettsville.
Utah.....N. C. Spalding, 73 N. 3 East St., Provo.
Vermont.....Maj. Geo. W. Brower, Fort Ethan Allen.
Virginia.....I. D. Wilson, Virginia Polytechnic Inst., Blacksburg.
Washington.....John R. Fuller, 14 S. 4th St., Walla Walla.
West Virginia.....S. E. Hershey, Box 283, Charleston.
Wisconsin.....Walter Wisnicky, Dept. of Agriculture and Markets, Madison.
Wyoming.....Clement E. Wilmot, 310 State House, Cheyenne.

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Canal Zone.....T. L. Casserly, Box 3035, Cristobal.
Hawaii.....L. E. Case, Box 296, Honolulu.
Philippine Islands..S. Youngberg, Bureau of Animal Industry, Manila.
Porto Rico.....H. L. Van Volkenberg, Agr. Exp. Sta., Mayaguez.
Virgin Islands.....G. A. Roberts, Christiansted, Saint Croix.

PHILIPPINE VETERINARY MEDICAL ASSOCIATION

A meeting of the Philippine Veterinary Medical Association was held on October 31, 1931, at the Filipino Club, Manila, P. I.

After a substantial dinner, which was enjoyed by about twenty-five members, the President, Dr. Victor Buencamino, called the meeting to order at 8:30 p. m. Dr. Buencamino then spoke at length on his plans for the development and proper recognition of the veterinary profession in the Philippines. He stated that this object could be attained only by the coöperation of every veterinarian, whether he is in the employ of the government or not. Thus, it is his desire that there should be frequent meetings of the Association, wherein the sincere opinion and criticism of each and every member will be duly considered. He also stated that the policies of the Bureau of Animal Industry will undoubtedly influence, in large measure, the rapid development of veterinary science in these islands and in his official capacity as Assistant Director of this Bureau, whatever innovations he has been able to introduce have been prompted by his desire to serve the best interest not only of the veterinarian but of the animal husbandman and the live stock owner as well.

Among the new policies inaugurated are the following: The raising of the status of the provincial veterinarian to a position analogous to that of the district engineer or district health officer, in matters pertaining to animal health and economics; the promotion of private practice by tacitly permitting the field veterinarian to charge for professional services rendered in places where no private practitioner is located; the permission to use rinderpest vaccine to licensed private practitioners; the active campaign to promote the poultry industry; the charging for certain laboratory services rendered by the Research Laboratory to wealthy live stock owners; the reorganization of the Statistical and Publications divisions; and the publication of the monthly *Gazette* of the Bureau. There are also several bills presented in the Legislature which, if enacted into laws, will undoubtedly

enhance the development of the poultry and animal industry of the Philippine Islands.

Of future plans, not much could be foretold. However, Dr. Buencamino would like to see the following accomplished. The field man should take an active interest in reading current scientific literature in his line of work, be he an animal husbandman or a veterinarian; the periodic training of a group of field men in the Pandacan Research Laboratory; the creation of a circulating library among the Bureau personnel; the establishment of an ambulatory clinic to help inexperienced veterinarians; the creation of the Division of Parasitology and Entomology and the coördination of the work of the Bureau with that of the College of Veterinary Science, the Animal Husbandry Department of the College of Agriculture, the Bureau of Education, the Munoz Agricultural School, etc.

The next speaker was Dr. Zacarias de Jesus, who read a scientific paper on "The Examination of Philippine Swine for *Cysticercus Cellulosae*." Dr. de Jesus described the practical method of determining cysticercus infestation in the living hog, as practiced by hog-dealers in Calamba market. This consists of retracting the tongue with a pair of pincers and palpating it for cysts. The method is not thoroughly efficient in determining cases of cysticercus infestation. A positive finding, however, invariably is confirmed on postmortem. He also presented tables and pictures to show measly pork and the incidence of this disease in hogs killed and condemned in the Manila abattoir. He concluded that the degree of infestation in Philippine hogs is from 2.37 to 4.44 per cent.

Following Dr. de Jesus, Dr. Marcos Tubangui spoke on "The Possible Transmission of Surra by Leeches." After reviewing the literature on the possible rôle of leeches in the transmission of trypanosomiases, he described his experiments on the longevity of *Trypanosoma evansi* in the stomach of water and land leeches. He found that this organism did not live longer than one hour in the water leech (*Hirudo manilensis*), and in the land leech for only four to five hours. Interrupted feeding experiments on guinea pigs and white rats showed that the land leech could transmit *Trypanosoma evansi* from one host to another. Dr. Tubangui concludes that there is a possibility that the land leech, under favorable circumstances, may transmit surra in horses that may be found in mountain trails or where these leeches are abundant. He also stated that it is possible that the

land leech may indirectly originate an outbreak of surra by transmitting the infection to a horse in the forests or mountain trails and, by what may be termed a "relay transmission," spread the disease in the plains through the agency of the *Tabanus striatus*, which is the principal insect vector of this disease.

The last speaker of the evening was Dr. A. K. Gomez, who spoke on "Statistical Analysis of Clinical Cases in Manila." Dr. Gomez presented statistical tables and graphs made from an analysis of the records of cases in Dr. Buencamino's veterinary hospital covering a period of fifteen years. Out of a total of 38,355 cases, only 19,311 showed recorded diagnoses and were therefore classifiable. He demonstrated by graphs that the highest incidence of such diseases as canine distemper, rabies, epizoötic lymphangitis and strangles occurred during the months of March, April and May; the lowest incidence is in October and there is a decided upward trend in December and January. He concluded by emphasizing the importance of keeping clinical records of cases and a systematic compilation of animal statistics.

With convincing arguments and alluring promises for a good time, Dean G. San Agustin presented the invitation of the College of Veterinary Science to the Association to hold its next annual meeting in Los Banos, Laguna. This invitation was duly accepted.

A. K. Gomez, *Secretary-Treasurer.*

CONNECTICUT VETERINARY MEDICAL ASSOCIATION

The regular quarterly meeting of the Connecticut Veterinary Medical Association was held at the Hotel Garde, New Haven, Conn., November 4, 1931. After the regular business session and luncheon, several reels of motion pictures were shown, demonstrating some of the major surgical operations on the human. The films were made available through the courtesy of Davis & Geck, Inc., of New York.

Edwin Laitinen, *Secretary.*

VETERINARY MEDICAL ASSOCIATION OF NEW YORK CITY

The regular monthly meeting of the Veterinary Medical Association of New York City was held Wednesday evening, November 4, 1931, at the Academy of Medicine Building, New York City.

Dr. R. S. MacKellar, chairman of the Executive Board of the American Veterinary Medical Association, reported on the Kansas City meeting of the national organization. As a complete report of the meeting had been published in the October issue of the JOURNAL of the A. V. M. A., Dr. MacKellar merely touched on the high spots of the meeting. He urged everyone to read the presidential address of Dr. Maurice C. Hall, which was referred to as a masterpiece. Dr. MacKellar reported the action of the A. V. M. A. in appropriating $5000.00 toward the expenses of the International Veterinary Congress.

Dr. B. J. Finkelstein, of Brooklyn, reported that in his county all observation dogs must go to the Board of Health shelter, no option being allowed the owner of an animal to have his dog quarantined in a veterinary hospital, as is the case in the four boroughs of New York City. After much discussion it was decided to appoint a committee to wait upon the Brooklyn Board of Health, to see if this question could not be settled to the satisfaction of all concerned.

Dr. R. W. Gannett reported that the Department of Education has prosecuted two illegal practitioners, one in Brooklyn and the other in Mount Vernon.

J. E. CRAWFORD, *Secretary.*

THIRD EASTERN STATES CONFERENCE ON BANG'S DISEASE

The third Eastern States Conference on Bang's Disease was held at the State House, Trenton, N. J., on November 9-10, 1931, under the auspices of the New Jersey State Department of Agriculture. The conference was a continuation of the meetings originally sponsored by the directors of the northeastern experiment stations, the first having been held at Storrs, Connecticut, in 1929 and the second at Cornell University, in 1930.

The first session of the 1931 conference, Dr. L. F. Rettger presiding, was given over principally to discussions of agglutination tests. Dr. John Northrop, of the Rockefeller Institute, Princeton, N. J., talked on "Agglutination," covering certain of the fundamentals that enter into the agglutination phenomenon. Experimental work on "The Production of Agglutinins for *Brucella Abortus* by Skin and Mucous Membrane Contact" was reported by Dr. L. E. Starr, Virginia Polytechnic Institute; and Dr. Harry R. Pearse, of the Rhode Island Public Health

Commission, gave his observations on "The Laboratory Aspects of Bang's Disease." Dr. M. F. Barnes, of the Pennsylvania Bureau of Animal Industry, presented "A Tentative Report on Uniform Technic under Consideration by Several States." This report was of considerable interest, denoting a desire for and tendency to more uniform methods of serological diagnosis.

Following the morning session, a visit was made to the laboratories of the New Jersey Bureau of Animal Industry, where some very fine demonstrations of apparatus and technic were put on by Dr. R. E. Hendershott, bacteriologist and pathologist for the Bureau.

The afternoon session, Dr. T. E. Munce presiding, was opened with a most valuable talk by Dr. Theobald Smith, of the Rockefeller Institute, on "The Interrelation of Strains of Brucella." Dr. Smith's talk was characterized by his unusually broad and fundamental grasp of the topic and published reports of his observations will be awaited with interest. He indicated the need for more careful and intensive work in studying fresh material for the effects of *Br. abortus* in bovines, and suggested that indiscriminate slaughter of reacting animals is not the best solution, on the basis of our present knowledge of the disease.

Other talks and papers during the afternoon were given by Professor George C. White, Connecticut Agricultural College, on "A Study of Re-infections Occurring in Apparently Clean Herds"; "Practical Methods of Controlling Bang's Disease," by Dr. C. S. Martin, University of New Hampshire; "What Should Constitute a Satisfactory Test for Interstate Shipment," by Dr. H. S. Gilman, Cornell University, and "Uniform Interstate Regulations for Bang's Disease," by Dr. E. M. Pickens, University of Maryland. Dr. L. F. Rettger, Yale University, presented the report of the Committee on Serological Diagnosis of Bang's Disease.

The evening session, Dr. E. M. Pickens presiding, had three unusually interesting papers. Dr. W. E. Cotton, U. S. Bureau of Animal Industry, gave his ideas on "How Far Can the Agglutination Test be Relied on to Detect Abortion Disease-Infected Animals." Dr. Cotton likened the agglutination test for *Br. abortus* infection to a young but not fully matured horse and expressed the opinion that it should not be over-loaded or overworked under existing conditions. Dr. R. R. Birch, of Cornell University, gave the best discussion heard to date on "Some Principles Underlying Official Regulations for Bang's Disease."

Dr. R. W. Smith, State Veterinarian of New Hampshire, read a paper in his usual straightforward manner, on "Some Problems of a Regulatory Official in a Program of Control and Eradication of Bang's Disease." The report of the Committee on Disposal of Reactors was ably presented by Dr. J. H. McNeil, New Jersey Bureau of Animal Industry.

A business session was called, at which Dr. L. F. Rettger was chosen chairman for the ensuing year. An invitation for the Conference to meet in Harrisburg, Pennsylvania, in 1932, was extended by Dr. T. E. Munce, Director of the Pennsylvania Bureau of Animal Industry, and was accepted. On account of the wide interest in the Conference and the problems with which it is concerned, together with the representation from so many states along the Atlantic seaboard, it was decided that the name "Eastern Conference" should be used, rather than "Northeastern," as originally designated. Following this a smoker was held.

Probably one of the most interesting features of the conference was the round-table discussion conducted on the morning of the second day, with Dr. J. H. McNeil presiding. At this time a number of topics were very freely and informally considered, including the doubtful reactor and how it should be handled; the handling of reacting cattle that subsequently give negative tests; the occurrence of partial reactions in apparently clean herds; the use of the rapid test and other subjects of every-day interest to the control official and control laboratory.

This was followed by a visit to the Rockefeller Institute for Medical Research, at Princeton, where Dr. Carl TenBroeck, the director, and members of the staff gave demonstrations of the work that is being carried on. From here, the group was taken for an inspection of the Walker-Gordon Laboratory Company plant at Plainsboro, where luncheon was served.

The success of the Conference is attested by the fact that more than 120 were present, coming from twelve different states and the Dominion of Canada. Most of those in attendance were live stock sanitary officials and their assistants, laboratory workers engaged either in control or research work, experiment station workers and practicing veterinarians. The local committee on arrangements included Hon. W. B. Duryee, Secretary of Agriculture, Trenton; Prof. L. F. Rettger, Yale University; Dr. J. H. McNeil, Chief, New Jersey Bureau of Animal Industry, and Dr. J. G. Hardenbergh, Plainsboro. It is expected that the

material presented at the conference will be available later in the form of a bulletin to be issued by the New Jersey Department of Agriculture.

J. G. HARDENBERGH, *Reporter.*

TRI-COUNTY VETERINARY ASSOCIATION

A meeting of the Tri-County Veterinary Association was held at Chatfield, Minn., November 12, 1931. About twenty-four veterinarians and their wives sat down to dinner at the Hotel Chatfield at 6:30 p. m. Following the banquet, the ladies adjourned to a local theatre and then returned to the home of Dr. R. Kjerner, where they were entertained at cards. The men were entertained by Drs. C. F. Schlotthauer and C. W. Olson, of the Mayo Clinic, Rochester, Minn. The subject of their discussion was the dog and they exhibited many beautiful lantern-slides showing the characteristics of the different breeds.

Officers for the coming year were elected as follows: President, Dr. F. C. Kochendorfer, Decorah, Iowa; vice-president, Dr. O. H. Titterud, Preston, Minn.; secretary-treasurer, Dr. P. H. Riede, Mabel, Minn.

The host and hostesses for this meeting were Dr. and Mrs. R. Kjerner, of Chatfield; Dr. and Mrs. J. N. Lietz, of Eyota, and Dr. and Mrs. C. W. Baker, of Fountain.

H. C. H. KERNKAMP, *Reporter.*

CENTRAL NEW YORK VETERINARY MEDICAL ASSOCIATION

The twenty-second semi-annual meeting of the Central New York Veterinary Medical Association was held at the Onondaga Hotel, Syracuse, N. Y., November 19, 1391. Dr. D. M. Hoyt presided. Roll-call showed thirty-two members and visiting veterinarians in attendance. The minutes of the 1930 semi-annual meeting were read and approved. There was no annual meeting held in June, as the Association met with the New York State Veterinary Medical Society, at the summer meeting.

A life membership was voted Dr. J. V. Townsend. Dr. G. W. Derrick reported for the Poultry Committee. The Chair appointed a committee, consisting of Drs. G. W. Derrick, D. A. Boardman and W. F. Burliegh, to work with the New York State Veterinary Medical Society on a plan to make local societies

a part of the State Society. The Secretary was instructed to notify the other district societies.

The following program was then presented: Dr. Myron G. Fincher, of Ithaca, N. Y., presented a paper on "The Cow." Dr. J. G. Wills, of Albany, N. Y., read a paper, entitled, "What Organization Can do for the Profession." Dr. H. J. Milks, of Ithaca, N. Y., presented a paper on "The Dog." Dr. A. K. Zellner, of Oneida, N. Y., read a paper, "New Legislation on Abortion."

A banquet followed the literary program.

W. B. SWITZER, *Secretary.*

SOUTHEASTERN WISCONSIN VETERINARY ASSOCIATION

A meeting of the Southeastern Wisconsin Veterinary Association was held at Juneau, Wis., September 8, 1931. About twenty members were in attendance. Dr. J. E. Hickey, of Juneau, a former president of the Association, presided during the luncheon and introduced Dr. F. B. Hadley, of the University of Wisconsin, and State Senator Eugene A. Clifford, of Juneau, both of whom made addresses.

The November meeting was held at West Bend, Wis., on November 19. Dr. Ed. Boesewetter, president of the Association, served a banquet for the members, at his home. About thirty veterinarians were in attendance. Dr. J. S. Healy, Dr. W. Wisnicky and Dr. B. A. Beach, of Madison, were the guests of honor at this meeting.

WESTERN MICHIGAN VETERINARY MEDICAL ASSOCIATION

The Western Michigan Veterinary Medical Association was reorganized at a meeting held at the hospital of Dr. J. Y. Veenstra, Grand Rapids, Mich., December 10, 1931. This organization had been quiescent for a period of approximately five years. Twenty-seven veterinarians from seven counties attended the reorganization meeting and elected officers, as follows: President, Dr. L. L. Miller, Caledonia, Mich.; vice-president, Dr. Herman Dykema, Muskegon; secretary-treasurer, Dr. Charles H. Haasjes, Shelby, Mich.

The following program was presented:

"Surgery in Small Animals," by Dr. Herman Dykema, Muskegon.
"Milk Inspection Problems," by Dr. E. F. Meyer, Grand Rapids.
"Problems in Bovine Sterility," by Dr. C. F. Clark, East Lansing.
"Problems of Interest to Practitioners," by Dr. B. J. Killham, East Lansing.
"Interpretation of Clinical Symptoms," by Dr. Charles H. Haasjes, Shelby.
"Sheep Parasites," by Dr. L. B. Sholl, East Lansing.

After the literary program, several clinical cases in small animals were presented and discussed.

C. H. HAASJES, *Secretary.*

NORTHEASTERN INDIANA VETERINARY MEDICAL ASSOCIATION

A meeting of the Northeastern Indiana Veterinary Medical Association was held at Fort Wayne, Ind., December 15, 1931.

The guest speaker was Dr. L. A. Merillat, of Chicago, who lectured on therapeutics in veterinary medicine. Following the meeting, a banquet was held at the Catholic Community Center. Clifford Kirkpatrick entertained the members with a few parlor magic acts.

Officers for the year were elected as follows: President, Dr. W. C. Kortenber, of New Haven, Ind.; vice-president, Dr. G. L. Clerk, Columbia City; secretary-treasurer, Dr. Harry W. Brown, Fort Wayne.

About forty veterinarians and their wives were in attendance.

WEST VIRGINIA VETERINARY MEDICAL ASSOCIATION

The annual meeting of the West Virginia Veterinary Medical Association was held at Charleston, W. Va., December 15-16. The out-of-state speaker was Dr. A. F. Schalk, of Ohio State University, who delivered two addresses during the meeting. The subjects of these addresses were: "Points of Practical Importance Concerning the Ruminant Stomach" and "The Need and Place of the Veterinarian in Public Health Service."

Officers for the ensuing year were elected as follows: President, Dr. C. T. Higginbotham, South Charleston: vice-president, Dr. J. L. Core, Shinnston; secretary-treasurer, Dr. J. H. Rietz, Morgantown.

The 1932 meeting will be held in Clarksburg.

J. H. RIETZ, *Secretary.*

WESTERN NEW YORK VETERINARY MEDICAL ASSO.

The eighteenth annual meeting of the Western New York Veterinary Medical Association was held December 17, 1931, at Buffalo, N. Y.

A clinical program was disposed of in the early afternoon, after which a business meeting was held. Officers for 1932 were elected as follows: President, Dr. Frank L. Stein, Rochester; vice-president, Dr. Harrison V. Baker, Hamburg; secretary-treasurer, Dr. F. F. Fehr, Buffalo. Dr. F. E. McClelland and Dr. R. H. Volgenau, both of Buffalo, were chosen censors for three years, succeeding Dr. E. L. Volgenau, of Buffalo, and Dr. W. D. Bennett, of Batavia, whose terms expired.

At six-thirty a banquet was served at Hotel Touraine and enjoyed by seventy-five members, their wives and friends.

After the dinner a literary program was given. Dr. W. A. Hagan, of Cornell University, gave a talk on "Recent Progress in Research." Dr. W. J. Rumney, of Hamilton, Ontario, spoke on "Streptococcus and Pneumococcus Infection in Dogs." This was followed by a paper on the subject, "Some of the Difficulties a Country Practitioner Meets," by Dr. Harry R. Greene, of Brockport, N. Y. The ladies were entertained meanwhile at a theatre party. Mrs. C. R. Perkins, of Buffalo, acted as hostess.

The day being an ideal one, as far as weather conditions were concerned, a large number attended and all voted it one of the best meetings ever held.

F. F. FEHR, *Secretary-Treasurer.*

NORTHWESTERN ILLINOIS VETERINARY MEDICAL ASSOCIATION

The thirteenth annual meeting of the Northwestern Illinois Veterinary Medical Association was held at the Court House, Freeport, Ill., October 8, 1931, with forty members in attendance. Drs. D. F. Luckey and Robert Graham were the principal speakers. Officers were elected as follows: President, Dr. H. C. Curtis, Polo; vice-president, Dr. Lee B. Swingley, Oregon; secretary-treasurer, Dr. Roy E. Kluck, Freeport.

TENTH DISTRICT (IND.) VETERINARY ASSOCIATION

Twenty-five veterinarians met at Connersville, Ind., November 19, 1931, and organized the Tenth District Veterinary Association. Dr. H. Meade Hamilton, of Muncie, Ind., was elected president, and Dr. R. E. Kepner, of Newcastle, Ind., was elected secretary-treasurer.

NECROLOGY

ROBERT H. HARRISON

Dr. Robert H. Harrison, of Saint Paul, Minn., died at his home, December 13, 1931, after an illness of about a week.

Born in Gloucester County, N. J., March 9, 1862, Dr. Harrison received his early education in Lowell, Mass. He attended Harvard University and the American Veterinary College. He was graduated from the last-named institution with the degree of D. V. S. in 1881. For five years he was instructor in anatomy and operative surgery in the Veterinary Department of Harvard University, which he helped to organize. He also was superintendent of the Veterinary Hospital of the institution. About 1893 he removed from Boston, Mass., to Atchison, Kansas. For five years he was professor of pathology and dentistry in the Kansas City Veterinary College.

Dr. Harrison entered the service of the U. S. Bureau of Animal Industry, February 7, 1898, and was assigned to meat Inspection at Milwaukee, Wis. About 1903 he was transferred to Saint Paul, Minn., and several years later to Eau Claire, Wis. He was stationed here only a short time, returning to Saint Paul, where he remained until his death.

Dr. Harrison joined the A. V. M. A. in 1881 and upon completion of 25 years of active membership, was made a Fellow of the A. V. M. A. in 1907. He was a member of the National Association of B. A. I. Veterinarians. He is survived by his widow and one son.

CHRISTIAN DAVID HEMMY

Dr. C. D. Hemmy, of New London, Wis., died at the Community Hospital, December 1, 1931, as a result of a basal fracture of the skull. The accident that caused the fatal injury occurred earlier in the day, while attending a horse on a farm near the city.

Born at Beaver Dam, Wis., October 3, 1873, Dr. Hemmy attended local grade and high schools before entering the Ontario Veterinary College. Following his graduation in 1894 he practiced at Beaver Dam and Ripon, Wis., going to New London four years later.

Dr. Hemmy joined the A. V. M. A. in 1910. He had been a member of the Board of Education for the past eight years. He was a charter member of the local Rotary Club and had a large circle of friends in the community which he served for over 33 years. He is survived by his widow, three daughters, three brothers and two sisters.

ELDON SMITH

Dr. Eldon Smith, of Muskegon, Mich., died suddenly at his home, December 17, 1931. He had been in poor health for some time but his death was unexpected. A heart attack was the immediate cause of death.

Born at Thorndale, Ontario, April 13, 1871, Dr. Smith came to Michigan as a youth of 18. His veterinary education was secured at the Grand Rapids Veterinary College. Following his graduation in 1903, he was appointed assistant city milk inspector of Grand Rapids. Later he was appointed City Veterinarian. He also served as Chief Milk Inspector of Grand Rapids for twelve years.

In 1918 Dr. Smith removed to Muskegon, to accept the position of City Bacteriologist and Milk Inspector. Later he was asked to serve Muskegon Heights in the same capacity. Dr Smith made a splendid reputation for himself in his efforts to give these cities a clean and wholesome milk and water supply.

Dr. Smith joined the A. V. M. A. in 1916. He was also a member of the Michigan State Veterinary Medical Association. His fraternal affiliations were numerous. He belonged to York Lodge No. 410, F. & A. M., Grand Rapids, and to the Muskegon Commandery and Consistory. He was also a Shriner and a member of the Muskegon Lodge of Elks. He also belonged to the Maccabees and the Woodmen. He is survived by his widow, one son, one daughter, three sisters and a brother.

HILARY J. CAMPBELL

Dr. Hilary J. Campbell, of Pine Bluff, Ark., died suddenly, November 25, 1931, at the age of 72. He was a graduate of the

Chicago Veterinary College, class of 1894, and was located at Anderson, Ind., and later at Pine Bluff, Ark. Before going to Anderson, Dr. Campbell was chief adjuster for a live stock insurance company at Kankakee, Ill. He was also quite active in Illinois Republican politics and, for a number of years, was postmaster at Roberts, Ill. The funeral was held at Gilman, Ill.

W. A. KNIGHT

Dr. W. A. Knight, of Houston, Texas, died at his home on August 27, 1931, at the age of 74, following an apoplectic stroke. He was a graduate of the Chicago Veterinary College, class of 1892, and at one time was state veterinarian of Texas. He joined the A. V. M. A. in 1901.

JAMES L. BARBER

Dr. James L. Barber, of Tyndall, South Dakota, is reported to have died in a Chicago hospital, November 22, 1931, following an operation for abdominal cancer. He was a graduate of the McKillip Veterinary College, class of 1909, and was located in Pierre, S. D., before going to Tyndall.

Dr. Barber joined the A. V. M. A. in 1909.

THOMAS B. HOWARD

Dr. Thomas B. Howard, of Watsonville, Calif., died December 2, 1931. He was a graduate of the Chicago Veterinary College, class of 1889. He was formerly in practice at Montpelier, Ind., and the body was returned there for burial. Dr. Howard is survived by one son.

IVAN J. BROBECK

Dr. Ivan J. Brobeck, of Richwood, Ohio, died at his home, December 22, 1931, after an illness due to a complication of diseases, dating back for about a year.

Born at Jerome, Ohio, February 9, 1881, Dr. Brobeck attended local grade school and the La Rue High School before entering Ohio State University. Upon his graduation in 1904, Dr. Brobeck located at Richwood and practiced there for 27 years.

Dr. Brobeck joined the A. V. M. A. in 1928. He was a member of the Ohio State Veterinary Medical Association and the Masonic lodge at Richwood. He is survived by his widow, two sons, four daughters and two sisters.

E. D. ROBINSON

Dr. E. D. Robinson, of Lena, Wis., died in a hospital at Oshkosh, December 19, 1931, following an illness of a week, due to pleuro-pneumonia.

Born in Youngstown, N. Y., December 16, 1885, Dr. Robinson received his veterinary education at the Ontario Veterinary College. Following his graduation in 1910, he located at Lena, where he engaged in general practice until his final illness. He is survived by his widow, two daughters, his parents, two brothers and a sister.

Our sympathy goes out to Dr. Frank Dallas Movelle, of Derby, Conn., in the death of his wife, Jennis Darrow Movelle, November 24, 1931.

PERSONALS

BIRTHS

To Dr. and Mrs. F. L. Richelieu, of Visalia, Calif., a daughter, Margaret Ann, August 30, 1931.

To Dr. and Mrs. Jno. Ramsey, of Fort Worth, Texas, a daughter, Jennie Louise, October 26, 1931.

PERSONALS

Dr. Fay G. Rankin (Colo. '28) has removed from Saint Helens, Ore., to Clatskanie, Ore.

Dr. Harold B. Hodgson (Ga. '21) is Dairy and Food Inspector, Department of Health, Athens, Ga.

Dr. Martin L. Hutchins (U. P. '16), formerly of Rock Glen, Pa., is now at 336 Market St., Sunbury, Pa.

Dr. E. M. Rogers (Chi. '10), formerly of Rice Lake, Wis., has located for general practice at Shell Lake, Wis.

Dr. Frank B. Batten (O. V. C. '94), of Lexington, Ky., recently underwent a major operation at a local hospital.

Dr. L. B. Wolcott (K. S. C. '12) reports a change of address from Shelton, Nebr., at 917½ Bonnie Brae, Los Angeles, Calif.

Dr. C. H. Hofstrand (U. P. '13), of Churchs Ferry, N. Dak., is a member of the North Dakota State Livestock Sanitary Board.

Dr. C. W. Barber (Colo. '31), of Blanca, Colo., is taking graduate work at the New York State Veterinary College, Cornell University.

Dr. S. E. Cottrill (Ont. '05), who has been in practice at Wisconsin Rapids, Wis., for the past 23 years, has removed to New London, Wis.

Dr. B. B. White (K. S. C. '20) reports a change of address from Berkeley, Calif., to San Jose, Calif. Address: Box 1527 McDaniel Ave.

Dr. F. M. Cahill (St. Jos. '08), of Saint Joseph, Mo., is president of the Humane Society of Saint Joseph and Buchanan County, Missouri.

Dr. John Enama (K. C. V. C. '18), formerly of Dassel, Minn., has removed to Lake City, Minn., and taken over the practice of the late Dr. C. S. Shore.

Dr. Leonard R. Richardson (O. S. U. '31) has been taking postgraduate work in pathology at the College of Veterinary Medicine, Ohio State University.

Dr. S. F. Scheidy (U. P. '29), who has been at the University of Pennsylvania, the past year, is now located at Chambersburg, Pa. Address: 122 N. Franklin St.

Dr. Frederick P. Ruhl (Amer. '85), of Milford, Del., sailed for Bermuda, on December 19, for a well-earned rest and vacation. Dr. Ruhl has been in active practice for 47 years.

Dr. L. A. Wileden (Mich. '13), of Mason, Mich., is a member of the local Board of Education and recently completed a term as president of the Ingham County School Officers Association.

Dr. Geo. N. Cunningham (Chi. '18), of Freeport, Ill., recently received an appointment in the Illinois Department of Agriculture and has been assigned to the Union Stock Yards at Chicago.

Dr. Louis D. Mersch (Iowa '28) resigned as executive secretary of the Iowa Veterinary Medical Association, effective January 1. He may be addressed: c/o Mrs. Paul Dorweiler, Sr., West Bend, Iowa.

Dr. C. E. Hammerberg (Ont. '10), of Crandon, Wis., has purchased the hospital and practice of the late Dr. C. D. Hemmy, at New London, Wis. Dr. Hammerberg practiced at Crandon for twelve years.

Dr. Reuben Hilty (O. S. U. '07), of Toledo, Ohio, addressed the Reserve Officers' Association, on December 7, at the Fort Meigs Hotel, Toledo. Dr. Hilty's subject was "What an Officer Should Know About a Horse."

Dr. Paul S. Dodd (Ind. '18), of Charleston, Ill., was recently elected Vermillion County Veterinarian, by the Board of Supervisors. Dr. Dodd previously held a similar position in Coles County. He will have his new headquarters at Danville, Ill.

Dr. J. H. McLeod (McGill '94), who has been engaged in regulatory work in connection with tuberculosis eradication in Iowa, since area work was started eight years ago, has decided to return to general practice and is now at his former location, Charles City, Iowa.

Dr. T. A. Sigler (Ind. '02), of Greencastle, Ind., has been appointed a member of the Board of Trustees of the Putnam County Hospital. In commenting upon the appointment, one of the Greencastle papers stated that Dr. Sigler was probably as well, if not better, qualified than any other resident of the community for his new post.

Dr. J. P. Iverson (San Fran. '06) has been appointed Chief Market and Food Inspector, Health Department, City of Oakland, Calif. His new duties include supervision of meat and sanitary inspection work. These two activities were recently combined under one head, in connection with the reorganization of the Health Department.